User's Manual

Diskeeper® Home Edition for Windows®

October 2004

This document describes the installation and operation of Executive Software International's Diskeeper, *The Standard in Entire Network Defragmentation*™ for Microsoft® Windows. It is intended primarily for Windows system administrators and managers.

Revision/Update Information:	This is a new manual
Software Versions:	Diskeeper 9.0 Home Edition
Operating Systems:	Windows XP (all editions) Windows 2000 Professional Windows Millennium Edition (Me) Windows 98 Windows 95 (OSR 2 or higher)

Executive Software International, Inc., Burbank, California, USA

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Preface

What This Book is About

Welcome to the Diskeeper Home Edition User's Manual. We realize software manuals tend to be one of the least-favorite pieces of reading material around, so we intend to make this one as painless as possible. This book will first help you get Diskeeper quickly installed and running. Next, it describes the various Diskeeper features and how to use them. Finally, it defines disk fragmentation and how it affects your Windows systems.

Structure of This Book

- Chapter 1 describes how to install Diskeeper.
- Chapter 2 explains how to start using Diskeeper and how to see the amount of fragmentation on your disk volumes.
- Chapter 3 gives a brief overview of Diskeeper.
- Chapter 4 explains the various features of Diskeeper in detail.
- Chapter 5 presents the theory of Diskeeper operation.
- Appendix A has tables showing the different Diskeeper editions, and the operating systems, features and capacities they support.
- Appendix B provides answers to frequently asked questions.
- Appendix C explains how to contact your Executive Software Customer Service Representative for Support Services.
- The Glossary provides definitions of technical terms used in this manual.

Introduction

Throughout its history, Diskeeper has improved with each new version. Diskeeper Home Edition sets the standard in simplified disk defragmentation with innovative new features and approaches to solving fragmentation problems for home users.

From its trademark "Set It and Forget It" scheduling to the comprehensive performance and reliability analysis, Diskeeper Home Edition is designed to solve your disk fragmentation problems permanently, and keep you informed about the condition of all your disks.

Diskeeper Home Edition is only one member of the comprehensive Diskeeper family of defragmentation products. There are different Diskeeper editions for everyone, from home users to the world's largest IT departments.

The Diskeeper lineup also includes:

- ***Diskeeper Professional Edition***
- ***Diskeeper Server Standard Edition***
- ***Diskeeper Server Enterprise Edition***
- ***Diskeeper Administrator Edition***

See *Appendix A* for tables showing all the Diskeeper editions with the features and operating system versions they support.

About Fragmentation

As used in this manual, the term *disk fragmentation* means two things:

- a condition in which pieces of individual files on a disk volume are not contiguous, but rather are broken up and scattered around the disk; and
- a condition in which the free space on a disk volume consists of little pieces of space here and there rather than a few large free spaces.

The effects of excessive fragmentation are twofold as well:

- file access takes longer because a file must be collected in pieces here and there, requiring several disk accesses instead of just one; and
- file creations take longer because space for the file must be allocated in little pieces here and there instead of just one contiguous allocation.

The bottom line—fragmentation slows Windows system performance. The longer you wait to defragment your disk volumes, the slower your computer runs.

With Diskeeper, all the disks in a Windows operating system can be kept defragmented indefinitely. Diskeeper cleans them up and keeps them that way. This includes disks with compressed, encrypted and sparse files on NTFS volumes.

Running either invisibly as a background job or as a manual defragmenter, Diskeeper carefully rearranges files and free space on a disk volume so they consist of as few pieces as possible. Because Diskeeper runs online, there is no need to lock users off a disk while it is being defragmented.

Diskeeper is the complete “Set It and Forget It”® solution to the loss in system performance caused by disk fragmentation!

Other Important Products

Executive Software is known throughout the computer industry for its focused development of system management tools. If you are running Windows NT, Windows 2000, Windows XP or Windows Server 2003, you should also use:

Undelete® for Windows

Instantly recover files that have been accidentally deleted anywhere on your network. Undelete sets up a Recovery Bin that caches all deletions—even versions created between backups—and saves you the time and money of wading through backups. Undelete also includes a recovery tool for files that have been deleted before Undelete was installed. Data is your business. Complete your data protection solution with Undelete, available from your local reseller or directly from Executive Software.

Sitekeeper® System Management Software

Get at-a-glance updates on every software version, build, update and patch. Also see detailed hardware information including processor speed, RAM, hard drive size, logical free space and asset management tags from the BIOS and motherboard. Install/uninstall programs with a few clicks of the mouse.

Chapter 1

Diskeeper Installation

This chapter provides information you need before, during, and after installing Diskeeper.

Before the Installation

Windows Versions and Platforms Supported

Diskeeper runs on the Intel® x86 platform (including Pentium™ and compatible CPUs from other manufacturers) running Windows Server 2003, Windows XP Professional, Windows 2000 Professional or Server, Windows NT 4.0 Workstation or Server, Windows Me, Windows 98, or Windows 95 (OSR 2).

The Windows versions supported varies by Diskeeper edition. See *Table of Diskeeper Editions* on page 53 for a table showing the different Diskeeper editions and the Windows versions they support.

File Systems Supported

Operating System	File Systems
Windows XP	NTFS, FAT16 and FAT32
Windows Me Windows 98 Windows 95 (OSR 2 or higher)	FAT16 and FAT32

Note that the 12-bit FAT file system is not supported. (The 12-bit FAT file system is used on FAT volumes smaller than 16 megabytes in size, such as floppy disks).

Disks Supported

Diskeeper supports a wide range of SCSI and IDE disks, including:

- Primary Partitions
- Extended Partitions
- Logical Drives
- Volume Sets
- RAID Arrays
- Mirrored Disks
- Mounted Volumes (letterless drives)

Resource Requirements

The disk space requirements for Diskeeper depend on several factors. On most systems, Diskeeper will need about 11 MB. Allow about 10 MB of extra free space for temporary files during the installation. If Internet Explorer is not present on your computer, some other needed files (hhupd.exe, 50comupd.exe, and wintdist.exe) may be added. Further, your system may require a new or updated version of DCOM (less than 3 MB) and/or MMC (less than 6 MB).

Additional Software Requirements

Diskeeper relies on the Microsoft Management Console (MMC). The MMC provides a single point of control for system utilities such as Diskeeper. The MMC is used as a central location for a variety of Microsoft and third party administrative tools.

Note: In most cases, Windows 95 systems are not running the MMC by default. The MMC normally has to be installed separately, except on Windows 2000 and Windows XP systems, where it is already built into the operating system. The Diskeeper setup process will automatically install the MMC on your computer if needed.

Installation Procedure—The Short Version

The Diskeeper installation is typically fast and simple. Here are the basic steps:

Note: On Windows 2000 and Windows XP, make sure you are logged onto an account that is a member of the Administrators group.

1. Insert the Diskeeper CD-ROM into the appropriate drive on your computer. (If you are installing from a downloaded file, double-click the file you downloaded.)
2. Follow the screens displayed, answering the questions asked as prompted.

That's it! It would still be a good idea to read *After the Installation* on page 4, but you're done with the installation.

Installation Procedure—The Details

Installation Overview

Diskeeper is installed by the **SETUP.EXE** program supplied on the Diskeeper CD-ROM. The **SETUP.EXE** program:

- Confirms that you have Administrator privileges (on Windows XP systems).
- Determines which Windows version you are running.
- Checks for sufficient space on the disk for the installation.
- Detects and removes any previously installed Diskeeper software.
- Copies the Diskeeper files to the destination directories, updates the Windows registry, starts the Diskeeper service, creates a link in the Windows Start menu for **Executive Software Diskeeper**, and creates a desktop shortcut (if you choose the option to do so).

Installation Procedure

Diskeeper can be installed from a CD-ROM, or it may be downloaded from the Web. This procedure applies to both methods. Before you start the installation, please note the following:

- Windows 95 machines must be OSR 2 or higher.
- Installing Diskeeper on Windows 2000 and Windows XP computers will not remove the built-in defragmenter, but Diskeeper will automatically become the default defragmenter. (The built-in defragmenter will be restored if you uninstall Diskeeper.)
- To install Diskeeper on Windows 2000 or Windows XP systems, you must be logged into an account that is a member of the Administrators group.

This installation procedure assumes you are installing from CD-ROM. If the Diskeeper software was downloaded from the Web, double-click the executable file in the directory into which it was downloaded and go directly to step 3.

1. Insert the Diskeeper CD-ROM into the appropriate drive on your computer.
2. The Windows AutoPlay feature automatically displays a screen that allows you to install Diskeeper or choose from an assortment of trialware versions of Executive Software products.

   If you have disabled the AutoPlay feature, simply double-click the **Setup.exe** file in the root-level folder on the CD-ROM and follow the instructions displayed.
3. Click **Next** when the welcome message appears.
4. After you have read and accepted the license agreement, click **Next** to continue.
5. As an option, you can change the destination location for the Diskeeper files. By default, Diskeeper is installed here:

   \Program Files\Executive Software\Diskeeper

   You can choose a different disk volume or directory for the installation as follows:

   a) Click **Change**.

   b) Make the desired changes to the destination and click **OK** to accept the new destination. If the directory you specify does not exist, a new directory will be created.

   c) Click **Next**.
6. If Internet Explorer 4.01 or higher is not installed on your computer, another installation program is started and a package of necessary components is installed on your computer. Microsoft Management Console (MMC), which is the interface for Diskeeper, requires these components. These components are a small subset of Internet Explorer—not the complete Internet Explorer product. Installing these components (hhupd.exe, 50comupd.exe, and wintdist.exe) will not affect your current web browser. Note that you must restart your computer after installing Diskeeper if these components are installed.
7. If the MMC is not installed on your computer, the MMC Setup program is started automatically. After the MMC files are installed, the Diskeeper Setup program resumes.
8. Setup detects and removes any previously installed Diskeeper software. (Any previous Diskeeper settings are not saved.)
9. On a Windows 2000 or Windows XP system, after Setup is complete, you can immediately start Diskeeper after clicking **Finish**. On Windows 95/98/Me systems, you may be required to restart your computer before running Diskeeper.
10. To run Diskeeper, click the Windows **Start** button, select **Programs**, and then **Executive Software Diskeeper**.

After the Installation

Check for Product Update

The first time you run Diskeeper, it automatically checks to see if a more recent version of Diskeeper is available. If so, you are given the option to download and install the newer version. When the download screen is displayed, click **Run this program from its current location** to begin installing the update. Or, click **Save this program to disk** to save the Diskeeper update installation package on your computer for later installation. (To install an update stored on your computer in this manner, simply double-click the file you download and follow the instructions displayed.)

You can check for Diskeeper updates any time you want. Use the **Check for product update** option in the Change your settings menu to see if a newer version of Diskeeper is available.

Registering Diskeeper

After the Diskeeper installation is complete, you may be given the option to register your Diskeeper purchase online. You can also register Diskeeper by mailing or faxing the registration card that comes with the CD.

Be sure to register your Diskeeper purchase to receive the free 90 days of telephone support included with Diskeeper.

About Windows Service Packs

Since Diskeeper uses mechanisms built into Windows 2000 and Windows XP that allow the safe movement of files on a disk that is actively being accessed by users, there is usually no need to upgrade Diskeeper Home Edition each time you install a new Windows Service Pack upgrade.

Repairing Windows Systems

Performing an emergency repair of a Windows system can possibly change or disable certain system information or services, which may make it necessary to reinstall Diskeeper after repairing your Windows system.

About the Diskeeper Service

Diskeeper is primarily designed as a “Set It and Forget It” disk defragmenter. In order to accomplish this goal, it creates a Windows service. The service allows Diskeeper to run in the background while other applications are running. As long as your operating system is up and running, Diskeeper can defragment your disks, whether you are logged on or not.

After installation, the Diskeeper service starts automatically each time your computer is restarted. The Diskeeper service runs all the time, whether or not defragmentation is occurring. This service consumes negligible system resources, and in most cases will never need to be disabled.

The Windows Application Event Log

When running under Windows 2000 or Windows XP, Diskeeper places messages in the Windows Application Event Log. By default, this log is 512 kilobytes in size and is set to overwrite events older than 7 days old. Diskeeper can quickly fill the log file if these default settings are used. To prevent this, perform these steps to change the size and overwriting characteristics of the Application Event Log:

1. Right-click the **My Computer** icon on your desktop and select **Manage**.
2. When the Computer Management Console is displayed, select **System Tools**, and then **Event Viewer**.

3. Expand the Event Viewer (by double-clicking it) and select **Application**.
4. Next, click the **Action** menu and select **Properties**.
    a) Set the **Maximum log size** to **2048** KB.
    b) Enable the **Overwrite events as needed** option.
    c) Click **OK**.

Diskeeper allows you to specify what information is written to the Application Event Log. For more information, see *Windows 2000/XP Event Log* on page 44.

Event Logging under Windows 95/98/Me

When running on Windows 95/98/Me, Diskeeper provides the option of logging Diskeeper events into a text file. When Diskeeper logs an event, the event and its message are appended to the Diskeeper log file. These events are written as a text file, which can then be viewed with Notepad, or your choice of text editor programs.

The Diskeeper log file is named **DkEventLog.txt** and it is stored in the directory folder where Diskeeper is installed. The file is limited to 1 MB in size. When it reaches this size, the log is purged completely and the event log is started from scratch.

Remote Installation

Diskeeper can be installed simultaneously on multiple computers in a network, using Diskeeper Administrator Edition.

Remote installation can be a tremendous time saver for system administrators, especially on large networks, where they may have to install Diskeeper on hundreds, or even thousands of computers.

For more information on remotely installing Diskeeper, see *Appendix D*.

Uninstalling Diskeeper

To uninstall Diskeeper on Windows NT, Windows 2000, Windows XP, and Windows Server 2003 systems, you must be logged into an account that is a member of the Administrators group.

Note that the controls may have slightly different names, depending on your version of Windows.

Follow these steps to completely remove and uninstall Diskeeper from your computer:

1. From the **Control Panel**, double-click **Add/Remove Programs**. (On Windows 95/98/Me or Windows NT systems, click the **Install/Uninstall** tab.)
2. Highlight the **Diskeeper** entry.
3. Click **Remove** or **Add/Remove** (Windows 95/98/Me and Windows NT). This removes the Diskeeper program files from your computer. In most cases, the Diskeeper installation directory will not be removed.
4. On Windows 2000, Windows XP, or Windows Server 2003 systems, the Windows Disk Defragmenter is restored to the state it was in before Diskeeper was installed.
5. Manually delete the Diskeeper installation directory if it exists.

Note: If the MMC has been installed on your computer, it will not be removed when Diskeeper is uninstalled.

Chapter 2

Getting Started

This chapter explains how to analyze the fragmentation on a disk volume, save the results, defragment the volume, and do a “before and after” comparison.

Introduction

Marketing research has shown that computer system performance and reliability continue to be major concerns among system administrators and computer users. Disk fragmentation is a major cause of these performance and reliability problems. Diskeeper is designed to not only handle the fragmentation problem, but to give you information about the performance and reliability status of your disk volumes.

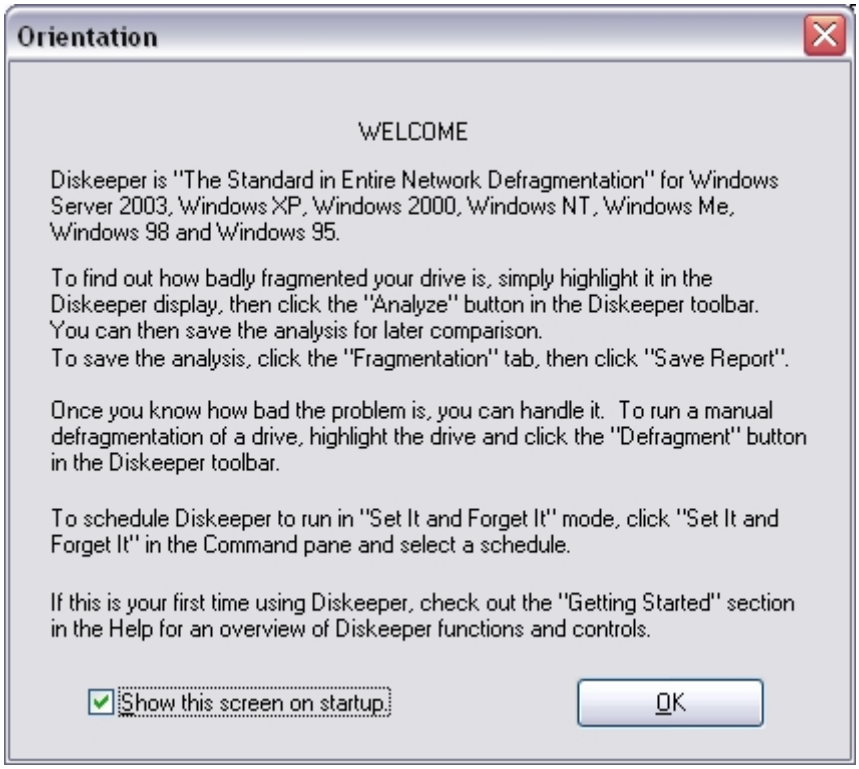
Keep in mind the primary purpose of a defragmenter is not to make your disks look “pretty”, but to improve the operating condition of your disk volumes. So while Diskeeper does provide a graphic view of your disks and any fragmentation found, more importantly, it shows you performance measurements and reliability data that you can apply to proactively keep your disk volumes in top shape.

Diskeeper performs a comprehensive analysis of the fragmentation on your disk volumes. After analyzing a disk, Diskeeper shows you the amount of performance improvement you will get by defragmenting the disk, and rates the reliability of the disk, based on the analysis results. Diskeeper also provides multiple methods by which to see the extent of the fragmentation—several graphic displays giving a graphic representation of the fragmentation on your volumes and a fragmentation report view showing statistical information about the fragmentation on your volumes.

After installing Diskeeper, you are ready to start Diskeeper and begin defragmenting your disk volumes. In order to see the actual gains from defragmentation, analyze the condition of your volumes before you begin defragmenting them. By reviewing the Diskeeper displays both before and after running Diskeeper, you will be able to see the actual reduction of file fragmentation and improvement in performance and reliability.

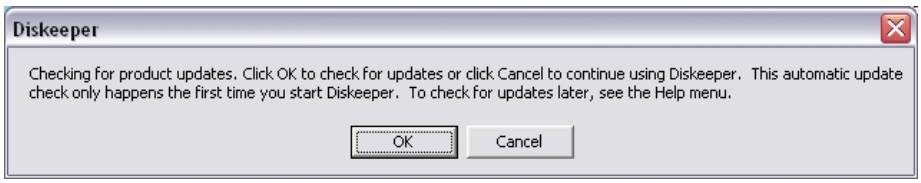
Quick Tour

When you start Diskeeper for the first time after a successful installation, you'll see this welcoming message:


Orientation
WELCOME
Diskeeper is "The Standard in Entire Network Defragmentation" for Windows Server 2003, Windows XP, Windows 2000, Windows NT, Windows Me, Windows 98 and Windows 95.
To find out how badly fragmented your drive is, simply highlight it in the Diskeeper display, then click the "Analyze" button in the Diskeeper toolbar. You can then save the analysis for later comparison.
To save the analysis, click the "Fragmentation" tab, then click "Save Report".
Once you know how bad the problem is, you can handle it. To run a manual defragmentation of a drive, highlight the drive and click the "Defragment" button in the Diskeeper toolbar.
To schedule Diskeeper to run in "Set It and Forget It" mode, click "Set It and Forget It" in the Command pane and select a schedule.
If this is your first time using Diskeeper, check out the "Getting Started" section in the Help for an overview of Diskeeper functions and controls.
Show this screen on startup.
OK

Read the message—it contains simple instructions on how to start using Diskeeper. After you have read the message, you can prevent it from displaying in the future by clearing the check box in the bottom left corner. Click **OK** to continue.

After the Welcome screen is displayed, Diskeeper checks to see if a more recent version is available.

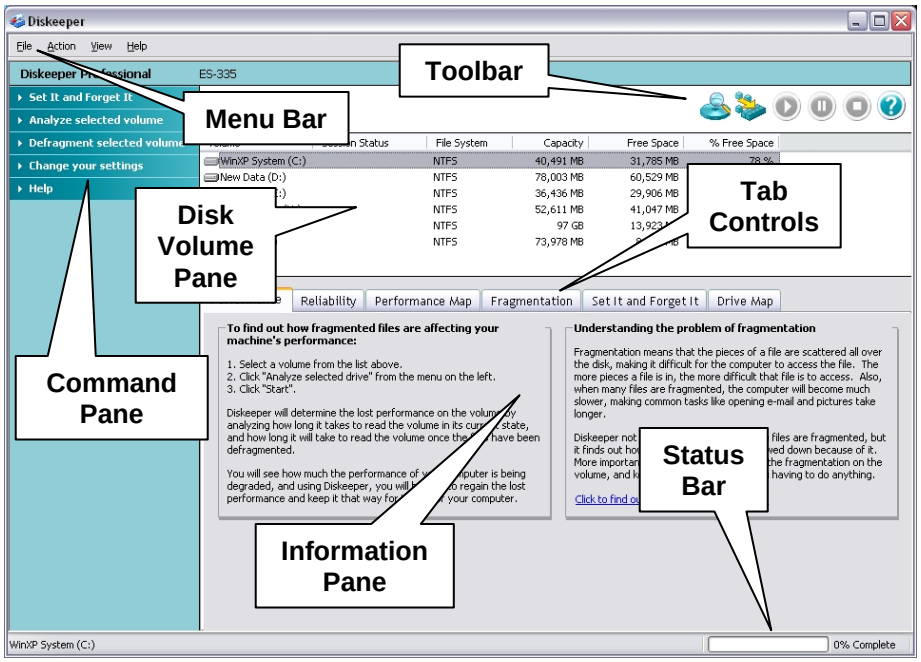

Diskeeper
Checking for product updates. Click OK to check for updates or click Cancel to continue using Diskeeper. This automatic update check only happens the first time you start Diskeeper. To check for updates later, see the Help menu.
OK
Cancel

Click **OK** to check to see if an update is available for Diskeeper. (Note that you must have an active internet connection in order for Diskeeper to check for a more recent version.)

If a newer version of Diskeeper is available, you are given the option of downloading it. When the download screen is displayed, click **Run this program from its current location** to begin installing the update. Otherwise, click **Save this program to disk** to save the Diskeeper update installation package on your computer for later installation. (To install an update stored on your computer in this manner, simply double-click the file you download and follow the instructions displayed.)

You can also check for Diskeeper updates any time you want. Use the **Check for product update** option in the Diskeeper **Help** menu.

After checking for updates, it's time to start learning about Diskeeper.

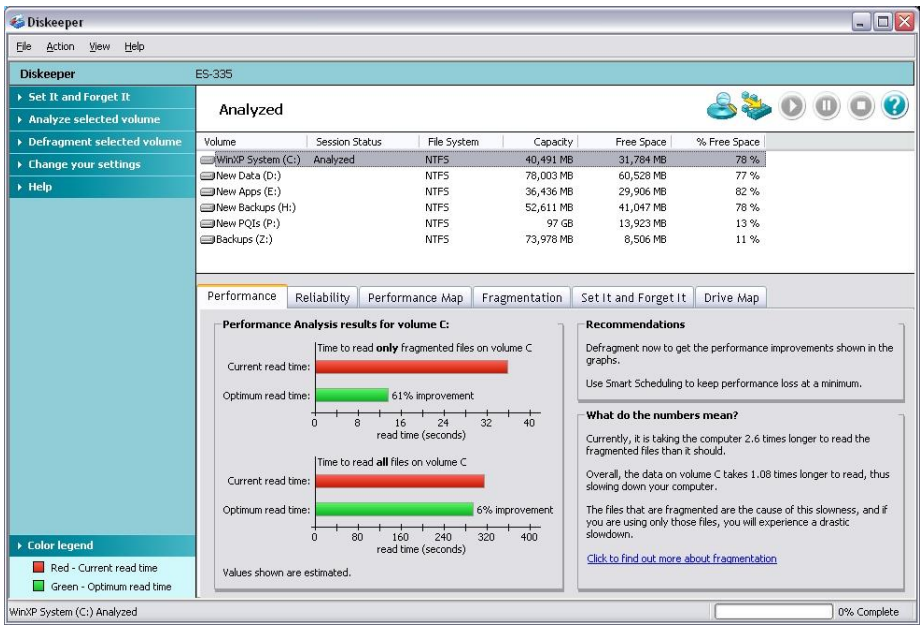


When you first start Diskeeper, the Performance tab pane is displayed. Like the other tab-controlled panes, this one gives quite a bit of information. This pane gives instructions for analyzing your drives, and also give you some background information about the effects of fragmentation.

Let's analyze a disk volume before we continue with the tour. Select a disk volume and click **Analyze selected volume**, then **Start** in the Command pane.

Tip: You can also use the Analyze button to start the analysis of the selected disk.

After Diskeeper analyzes or defragments a disk volume, the Performance pane displays a graph showing the performance loss on that disk due to fragmentation. Here's an example after analyzing drive C:

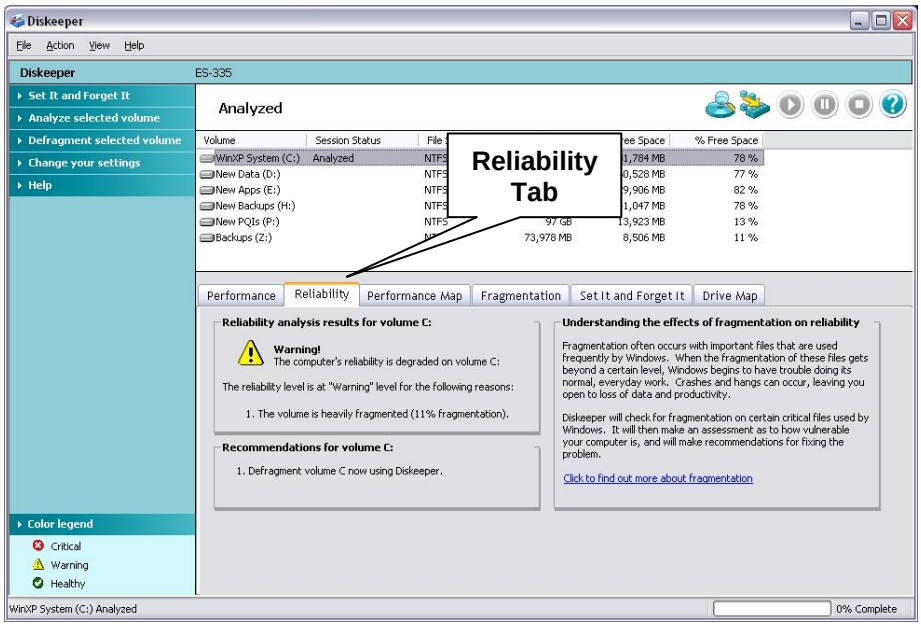


As you can see, the Performance pane now shows a performance analysis for drive C. The upper bar graph shows the current read times for only the fragmented files on the drive and the lower graph shows read times

for all the files on the drive. The graphs also show the expected optimum read time for both cases, based on drive performance measurements. This view gives you a detailed picture of your disk performance losses due to fragmentation, and the expected improvement you will see after defragmentation.

It should be noted that the first performance analysis is based on pre-determined disk performance values measured as a part of disk performance research done by Executive Software. To get a more accurate performance measurement of your actual disks, Diskeeper must scan your drives to measure their performance. Since this measurement can briefly slow down your computer, this scan operation is disabled by default, but you can turn it on easily. The **Set performance data options** option is described in the **Change your settings** menu section on page 37.

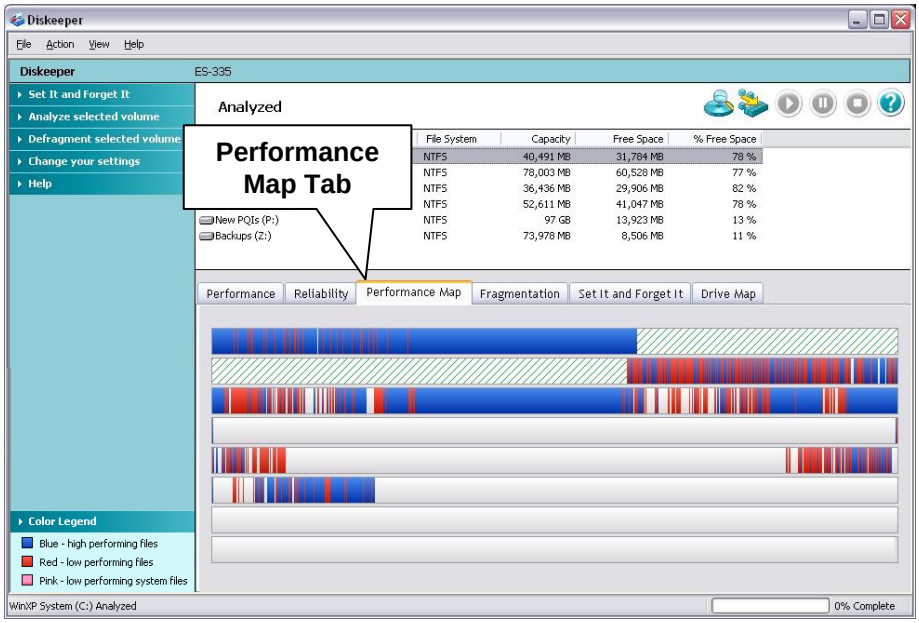
Now that we see how the performance of drive C is impacted by fragmentation. Let's look at reliability issues. Click the **Reliability** tab to see the Reliability pane:


Diskeeper
File Action View Help
Diskeeper
ES-335
Set It and Forget It
Analyze selected volume
Defragment selected volume
Change your settings
Help
Analyzed
Volume
Session Status
% Free Space
WinXP System (C:) Analyzed
New Data (D:)
New Apps (E:)
New Backups (H:)
New PQIs (P:)
Backups (Z:)
Reliability Tab
Performance
Reliability
Performance Map
Fragmentation
Set It and Forget It
Drive Map
Reliability analysis results for volume C:
Warning!
The computer's reliability is degraded on volume C:
The reliability level is at "Warning" level for the following reasons:
1. The volume is heavily fragmented (11% fragmentation).
Recommendations for volume C:
1. Defragment volume C now using Diskeeper.
Understanding the effects of fragmentation on reliability
Fragmentation often occurs with important files that are used frequently by Windows. When the fragmentation of these files gets beyond a certain level, Windows begins to have trouble doing its normal, everyday work. Crashes and hangs can occur, leaving you open to loss of data and productivity.
Diskeeper will check for fragmentation on certain critical files used by Windows. It will then make an assessment as to how vulnerable your computer is, and will make recommendations for fixing the problem.
Click to find out more about fragmentation
Color legend
Critical
Warning
Healthy
WinXP System (C:) Analyzed
0% Complete

The Reliability pane gives a reliability analysis and rating, the reasons for that rating, and recommendations for improving or maintaining the reliability of the disk volume.

In this example, the reliability analysis for drive C shows a considerable amount of fragmentation, warranting a "Warning" rating. The ratings are based on several factors. You may see different conditions on your disks, such as too little free space or a badly fragmented paging file.

Now we'll look at a picture of the fragmentation on drive C. Click the **Performance Map** tab to open the Performance Map pane shown here:

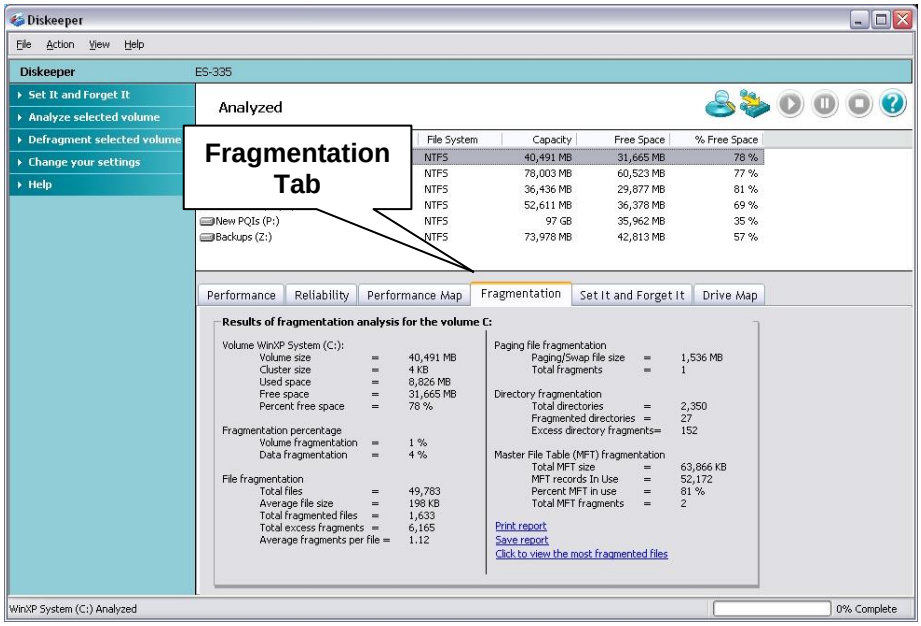

Diskeeper
File Action View Help
Diskeeper
ES-335
Set It and Forget It
Analyze selected volume
Defragment selected volume
Change your settings
Help
Analyzed
Performance Map Tab
File System Capacity Free Space % Free Space
NTFS 40,491 MB 31,784 MB 78 %
NTFS 78,003 MB 60,528 MB 77 %
NTFS 36,436 MB 29,906 MB 82 %
NTFS 52,611 MB 41,047 MB 78 %
NTFS 97 GB 13,923 MB 13 %
NTFS 73,978 MB 8,506 MB 11 %
New PQIs (P:)
Backups (Z:)
Performance Reliability Performance Map Fragmentation Set It and Forget It Drive Map
Color Legend
Blue - high performing files
Red - low performing files
Pink - low performing system files
WinXP System (C:) Analyzed
0% Complete

The group of horizontal bars in the Performance Map pane gives a graphic representation of the fragmentation of your disk volume (similar to the Drive Map pane, discussed shortly), with one major difference: It shows the extent of performance degradation on the disk instead of simply showing the fragmented files.

For example, a large file in two or three fragments causes no significant performance loss. In this case, the Drive Map tab would display this file in red (since it is fragmented) but the Performance Map would display the same file in blue (since it is not affecting the performance of your computer). The Performance Map tab gives you a more accurate look at the condition of the disk as it relates to the overall performance of your system.

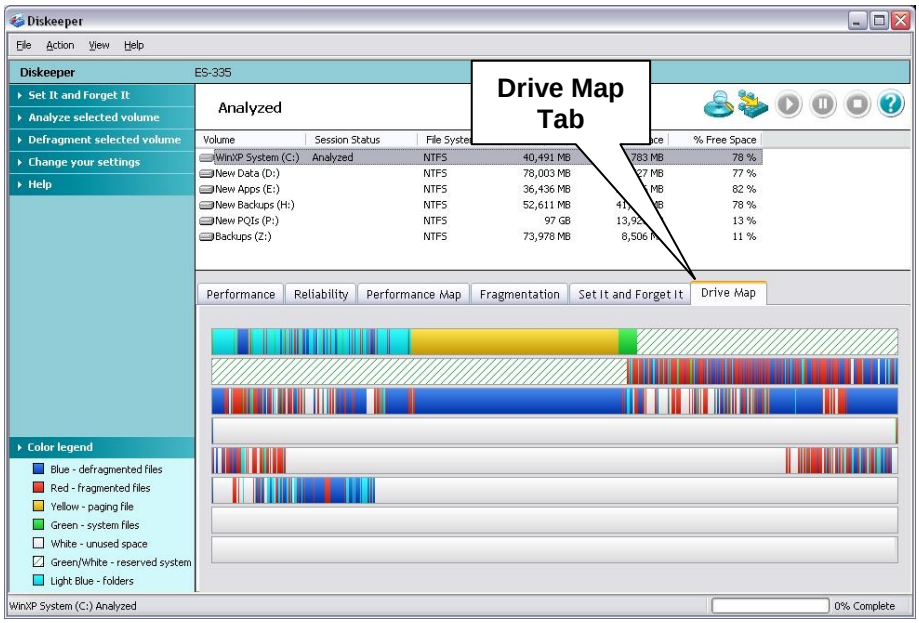
The color legend in the Command pane shows what the colors in the display mean. Of particular interest in this example, the red areas show the fragmented files on the disk.

Next, click the **Fragmentation** tab to see the Fragmentation pane:


Diskeeper
File Action View Help
Diskeeper
ES-335
Set It and Forget It
Analyze selected volume
Defragment selected volume
Change your settings
Help
Analyzed
Fragmentation Tab
File System Capacity Free Space % Free Space
NTFS 40,491 MB 31,665 MB 78 %
NTFS 78,003 MB 60,523 MB 77 %
NTFS 36,436 MB 29,877 MB 81 %
NTFS 52,611 MB 36,378 MB 69 %
NTFS 97 GB 35,962 MB 35 %
NTFS 73,978 MB 42,813 MB 57 %
New PQIs (P:)
Backups (Z:)
Performance Reliability Performance Map Fragmentation Set It and Forget It Drive Map
Results of fragmentation analysis for the volume C:
Volume WinXP System (C:):
Volume size = 40,491 MB
Cluster size = 4 KB
Used space = 8,826 MB
Free space = 31,665 MB
Percent free space = 78 %
Fragmentation percentage
Volume fragmentation = 1 %
Data fragmentation = 4 %
File fragmentation
Total files = 49,783
Average file size = 198 KB
Total fragmented files = 1,633
Total excess fragments = 6,165
Average fragments per file = 1.12
Paging file fragmentation
Paging/Swap file size = 1,536 MB
Total fragments = 1
Directory fragmentation
Total directories = 2,350
Fragmented directories = 27
Excess directory fragments= 152
Master File Table (MFT) fragmentation
Total MFT size = 63,866 KB
MFT records In Use = 52,172
Percent MFT in use = 81 %
Total MFT fragments = 2
Print report
Save report
Click to view the most fragmented files
WinXP System (C:) Analyzed
0% Complete

Useful information about the disk volume is shown in the Fragmentation pane. Note that most of the information here can also be recorded in the Diskeeper Event Log. For more information, see *Logging Diskeeper Activity* on page 44.

Now we'll look at another, more detailed picture of the fragmentation on drive C. Click the **Drive Map** tab to open the Drive Map pane shown here:



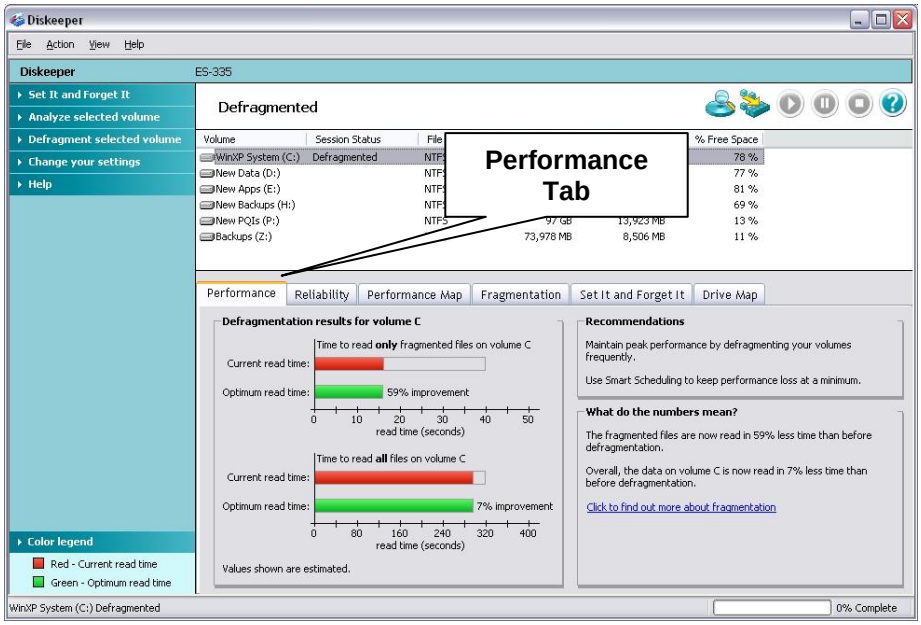
Like the Performance Map pane, the horizontal bars in the Drive Map pane give a graphic representation of the fragmentation of your disk volume. The Drive Map pane shows additional detail, including the paging file (if it exists) and other system files like the MFT on NTFS volumes. It also shows all the fragmentation (even fragmented file that are not affecting your system's performance).

Next, let's defragment drive C and see what type of improvement Diskeeper can provide. Click **Defragment selected volume**, then **Start** in the Command pane to start the defragmentation process. (Notice that drive C is still selected)

Tip: You can also use the Defragment button to start defragmenting the selected volume.

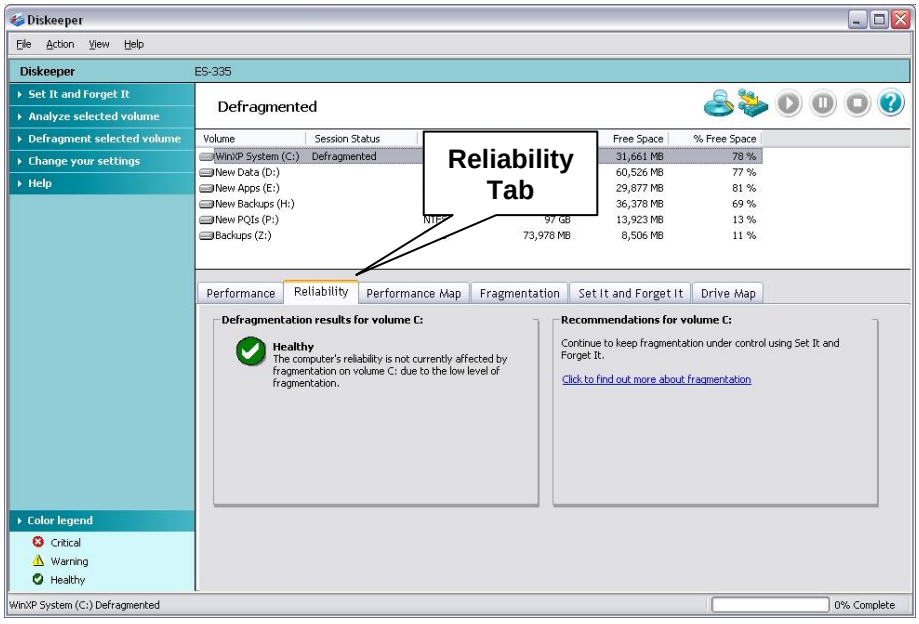
You can watch the progress of the defragmentation if you keep the Drive Map pane open while Diskeeper is defragmenting your disk.

After the defragmentation is complete, it's time to see how Diskeeper has improved the condition of the disk. Open the Performance pane by clicking the **Performance** tab. You will see a display similar to this:


Diskeeper
File Action View Help
Diskeeper
ES-335
Set It and Forget It
Analyze selected volume
Defragment selected volume
Change your settings
Help
Defragmented
Volume Session Status File % Free Space
WinXP System (C:) Defragmented NTFS 78 %
New Data (D:) NTFS 77 %
New Apps (E:) NTFS 81 %
New Backups (H:) NTFS 69 %
New PQIs (P:) NTFS 97 GB 13,923 MB 13 %
Backups (Z:) 73,978 MB 8,506 MB 11 %
Performance Tab
Performance
Reliability
Performance Map
Fragmentation
Set It and Forget It
Drive Map
Defragmentation results for volume C
Time to read only fragmented files on volume C
Current read time:
Optimum read time:
59% improvement
0 10 20 30 40 50
read time (seconds)
Time to read all files on volume C
Current read time:
Optimum read time:
7% improvement
0 80 160 240 320 400
read time (seconds)
Values shown are estimated.
Recommendations
Maintain peak performance by defragmenting your volumes frequently.
Use Smart Scheduling to keep performance loss at a minimum.
What do the numbers mean?
The fragmented files are now read in 59% less time than before defragmentation.
Overall, the data on volume C is now read in 7% less time than before defragmentation.
Click to find out more about fragmentation
Color legend
Red - Current read time
Green - Optimum read time
WinXP System (C:) Defragmented
0% Complete

In this example, you can see that defragmenting drive C has restored its performance back to the optimum level. The dotted lines in the graph display shows a good "before and after" picture of your drive's performance.

Next, check the reliability rating (or index) after defragmentation. Click the **Reliability** tab to open the Reliability pane. You'll see a display similar to this:


Diskeeper
File Action View Help
Diskeeper
ES-335
Set It and Forget It
Analyze selected volume
Defragment selected volume
Change your settings
Help
Defragmented
Volume Session Status Free Space % Free Space
WinXP System (C:) Defragmented 31,661 MB 78 %
New Data (D:) 60,526 MB 77 %
New Apps (E:) 29,877 MB 81 %
New Backups (H:) 36,378 MB 69 %
New PQIs (P:) NTFS 97 GB 13,923 MB 13 %
Backups (Z:) 73,978 MB 8,506 MB 11 %
Reliability Tab
Performance
Reliability
Performance Map
Fragmentation
Set It and Forget It
Drive Map
Defragmentation results for volume C:
Healthy
The computer's reliability is not currently affected by fragmentation on volume C: due to the low level of fragmentation.
Recommendations for volume C:
Continue to keep fragmentation under control using Set It and Forget It.
Click to find out more about fragmentation
Color legend
Critical
Warning
Healthy
WinXP System (C:) Defragmented
0% Complete

Now that drive C has been defragmented, its reliability index is "Healthy."

A quick review of the Performance Map pane, the Fragmentation pane and the Drive Map pane will also show improvement to the condition of the disk. Keep in mind that badly-fragmented disks may need more than one defragmentation run to completely handle the fragmentation problem.

Now, if you set up and start scheduled "Set It and Forget It" defragmentation jobs for your disk volumes, Diskeeper can maintain your disks in optimum condition automatically by running occasionally in the background without further intervention from you! For more information, see page 30.

Chapter 3

Overview of Diskeeper

This chapter provides important general information about Diskeeper Home Edition.

Diskeeper Features

The following list summarizes the most important Diskeeper Home Edition features:

Wide Array of Diskeeper Editions—The Diskeeper family of products offers specialized defragmentation of Windows operating systems ranging from Windows 95 through Windows Server 2003 Datacenter Edition. See the tables on page 53 for the complete Diskeeper lineup.

Descriptive Interface—The Diskeeper interface provides an intuitive and informative defragmentation experience. Common commands are grouped together in the Command pane, and a group of tabbed panes show you a wide variety of information. Diskeeper shows you the condition of your disks, and provides suggestions for improving or maintaining your disks.

Performance and Reliability Analysis—Diskeeper collects and displays data regarding the performance and reliability of your disk volumes. This information allows you to be more proactive in the management and maintenance of your computers. See pages 20 and 22 for more information about the Performance pane and the Reliability pane.

Set It and Forget It Operation—Diskeeper is designed to operate without your intervention. Set a schedule for the times you want Diskeeper to run, then sit back and let Diskeeper take care of your disk fragmentation. Of course, you can also run Diskeeper manually. (But you probably have better things to do with your time—that's what Set It and Forget It is for!)

Smart Scheduling®—This feature allows Diskeeper to automatically determine the optimum defragmentation schedule for each disk volume individually, and adjust that schedule as disk usage changes. By default, Diskeeper Home Edition enables Smart Scheduling automatically on all your disk volumes.

I/O Smart™—This feature keeps the defragmentation process from impacting your other work by "throttling" (suspending) the defragmentation process whenever disk I/O activity is detected on a disk while it is being defragmented. This ensures the defragmentation process will be transparent to you, no matter how active the disk.

Exclusion Lists—Diskeeper exclusion lists allow you to specify files and directories that will not be allowed to be processed by Diskeeper.

Event Logging—Diskeeper can record information about its activity in a log file. A wide variety of information can be saved for future reference.

Other Things to Know

- When running Diskeeper in the Set It and Forget It or Manual Defragmentation modes, you can run other tasks while defragmentation is occurring.
- Diskeeper runs as a Windows Service and it optionally logs useful defragmentation information into either the Windows Application Event Log (under Windows 2000 and Windows XP) or to a text file (under Windows 95/98/Me).
- Diskeeper can be uninstalled in the standard manner using the Add/Remove Programs applet in the Windows Control Panel. See page 5 for more information.

- You must be logged into an account that is a member of the Administrators group to run Diskeeper on Windows 2000 or Windows XP systems.
- Diskeeper relies on the Microsoft Management Console (MMC), which is available for Windows 95 and Windows 98. MMC is built into Windows 2000, Windows XP and Windows Server 2003. For more information about the MMC, see the *Glossary*.

Defragmentation Modes

Diskeeper Home Edition is designed to operate in two different ways—the "Manual Defragmentation" and "Set It and Forget It" modes. Both modes run while your disk volumes are online and available to other users.

Manual Defragmentation—Manual defragmentation gives you direct control over Diskeeper operation. You have control over which disk volumes are defragmented, when defragmentation is started and stopped, and the priority at which manual defragmentation jobs run. You can also choose between different defragmentation methods, to emphasize system performance or defragmentation speed.

Highlight the disk volume of your choice, then click **Defragment** in the Diskeeper toolbar to do a manual defragmentation. (Alternatively, you can click **Defragment selected volume**, then **Start** in the Command pane, or right-click the highlighted disk volume and select **Defragment**.)

Click **Pause** , **Resume** or **Stop** in the Diskeeper toolbar if you want to pause, resume or stop manual defragmentation at any time. These options are also available in the Action menu. For more information, see *Toolbar Buttons* on page 40.

Set It and Forget It—"Set It and Forget It" scheduling allows Diskeeper to run automatically in the background, either after hours or while users and other processes are active on the system, according to predetermined schedules you set. (Diskeeper supports two separate schedules for each disk volume on your computer—a "primary" and "secondary" schedule can be set for each.) By default, Diskeeper Home Edition enables Smart Scheduling automatically on all your disk volumes. The Smart Scheduling option allows Diskeeper to automatically determine the optimum defragmentation schedule for each of your disk volumes. As with manual defragmentation jobs, you can select several different defragmentation methods to suit your needs.

Tip: Select **Set It and Forget It** from the Command pane to choose from several commonly-used schedules.

This option is also available from the Action menu. For more information, see page 30.

Exclusion List

In some cases, you may have files or directory folders you do not want to defragment. For example, you may not want to defragment temporary files that will soon be deleted. Any files or directories can be excluded from Diskeeper processing by adding them to the exclusion list.

To use this feature, click **Change your settings** in the Command pane and select **Exclude selected files and folders**, or select the same option from the Action menu. For more information, see *Setting an Exclusion List* on page 41.

Event Logging

Diskeeper allows you to record information about its activity in a log file. Click **Change your settings** in the Diskeeper Command pane then select **Set event logging options** to alternately enable or disable the logging of various events to the Diskeeper Event Log. The logging method varies, depending on the version of Windows you are using. This option is also available from the Action menu. For more information, see *Logging Diskeeper Activity* on page 44.

Getting the Most from Diskeeper

Diskeeper Home Edition provides a variety of features, all of which are designed to help you get the best performance from your computer. While there are no “hard and fast” rules governing the use of Diskeeper, here are some general guidelines that will help you get the most from Diskeeper.

- When you first install Diskeeper, analyze all the disk volumes on your computer. This gives you good information about the extent of fragmentation on your computer.
- After you have analyzed your volumes, defragment them by running Diskeeper in its Manual Defragmentation mode. This provides the fastest method for defragmenting the files and free space on your volume. For more information on how to analyze and defragment manually, see page 7.
- Finally, schedule Diskeeper to run in the background in Set It and Forget It mode. Running in the Set It and Forget It mode, Diskeeper works quietly, keeping your disks in prime condition. (Diskeeper Home Edition automatically sets up Smart Scheduling for all your disk drives when it is installed.) For more information about scheduling Diskeeper, see page 32.

Chapter 4

Diskeeper Operation

This chapter describes how to operate Diskeeper.

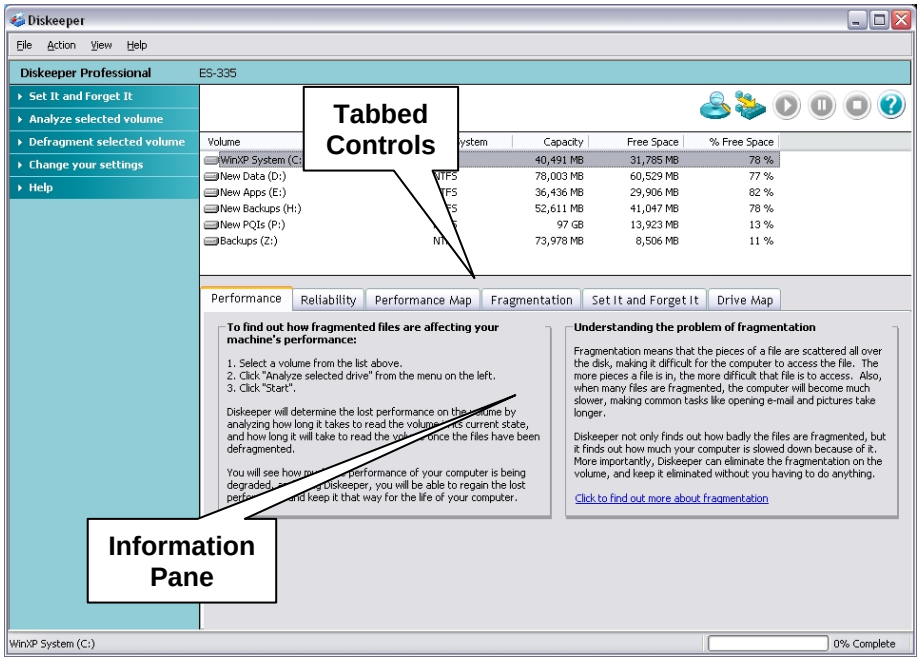
The Diskeeper Interface

As explained in Chapter 2, the Diskeeper user interface is made up of several distinct components. These are, in order of discussion:

- **Information Pane**—Shows the main "Operations Center" for Diskeeper. Each tab pane shows a different aspect of your disks' condition, or controls when Diskeeper runs.
- **Command Pane**—The Command pane is where you'll find easy access to the commonly-used Diskeeper features, as well as several shortcuts for performing common tasks.
- **Disk Volume Pane**—The disk volume pane shows all the supported disks detected on your computer.
- **Toolbar**—Diskeeper displays a toolbar of commonly-used controls above the Disk Volume pane. (The toolbar and other display components can be hidden by using the **Customize** option in the **View** menu.) Note that many of the functions on the toolbar are available from the Action menu, and can also be activated from the menu displayed when you right-click on a selected disk volume in the disk volume pane.
- **Menu Bar**—The Diskeeper menus provide an alternative way to access the features available from the Information pane and the Command pane.
- **Status Bar**—This section of the Diskeeper display shows the progress of any Diskeeper tasks currently running. The status bar also shows other useful information, like the folder location and name of the file being moved, as well as numbers showing the size of the file chunk being moved and the total size of the file.
- **System Tray Icon**—The Diskeeper icon in the Windows system status area (or system tray) provides a convenient way to see when Diskeeper is defragmenting one or more disk volumes on your computer. Right-click the icon to display these options:
  - Open Diskeeper
  - Stop running engines
  - Delay scheduled defragmentation

Information Pane

The Information pane section of the Diskeeper display is the main “Operations Center” for Diskeeper. Each tab pane shows a different aspect of your disks’ condition, or controls when Diskeeper runs.


Tabbed Controls
Information Pane
Diskeeper
File Action View Help
Diskeeper Professional
ES-335
Set It and Forget It
Analyze selected volume
Defragment selected volume
Change your settings
Help
Volume
Capacity
Free Space
% Free Space
WinXP System (C:)
New Data (D:)
New Apps (E:)
New Backups (H:)
New PQIs (P:)
Backups (Z:)
40,491 MB
31,785 MB
78 %
78,003 MB
60,529 MB
77 %
36,436 MB
29,906 MB
82 %
52,611 MB
41,047 MB
78 %
97 GB
13,923 MB
13 %
73,978 MB
8,506 MB
11 %
Performance
Reliability
Performance Map
Fragmentation
Set It and Forget It
Drive Map
To find out how fragmented files are affecting your machine's performance:
1. Select a volume from the list above.
2. Click "Analyze selected drive" from the menu on the left.
3. Click "Start".
Understanding the problem of fragmentation
Fragmentation means that the pieces of a file are scattered all over the disk, making it difficult for the computer to access the file. The more pieces a file is in, the more difficult that file is to access. Also, when many files are fragmented, the computer will become much slower, making common tasks like opening e-mail and pictures take longer.
Diskeeper not only finds out how badly the files are fragmented, but it finds out how much your computer is slowed down because of it. More importantly, Diskeeper can eliminate the fragmentation on the volume, and keep it eliminated without you having to do anything.
Click to find out more about fragmentation
WinXP System (C:)
0% Complete

The Performance Pane

One of the main reasons for defragmenting a disk volume is to restore or maintain the performance of the disk. As files become more and more fragmented, it takes longer to read those files from the disk. Measuring the length of time it takes to read a set of files from a disk (known as read time) is a common way of determining the anticipated performance level of that disk.

Each time you analyze or defragment a disk, Diskeeper calculates the read time of the disk in two ways. First, it shows the predicted time to read all the files on the disk. Secondly, it shows the time to read only the fragmented files. Additionally, it determines the optimum (fastest) read time potential for the disk.

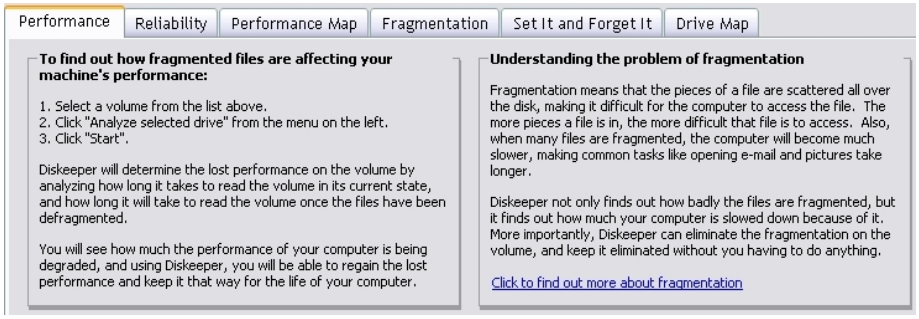
It should be noted that by default, the performance analysis is based on pre-determined disk performance values measured as a part of disk performance research done by Executive Software. To get a more accurate performance measurement of your actual disks, Diskeeper must scan your drives to measure their performance. Since this measurement can briefly slow down your computer, this scan operation is disabled by default, but you can turn it on easily. The **Set performance data options** option is described in the **Change your settings** menu section on page 37.

When you first start Diskeeper, the Performance pane gives instructions for analyzing your drives, and also give you some background information about the effects of fragmentation. After a disk has been analyzed or defragmented, the performance pane changes to show a graph illustrating the performance characteristics of the disk, based on current read times calculated by Diskeeper—both for all the files on the drive and for only the fragmented files on the drive. It also shows the expected optimum read time for all the files and for only the fragmented files. This view gives you a detailed picture of your performance losses due to fragmentation, and the expected improvement you will see after defragmentation.

The Performance pane displays information for a single disk volume at a time. The disk highlighted in the disk volume pane is the disk described in the Performance pane.

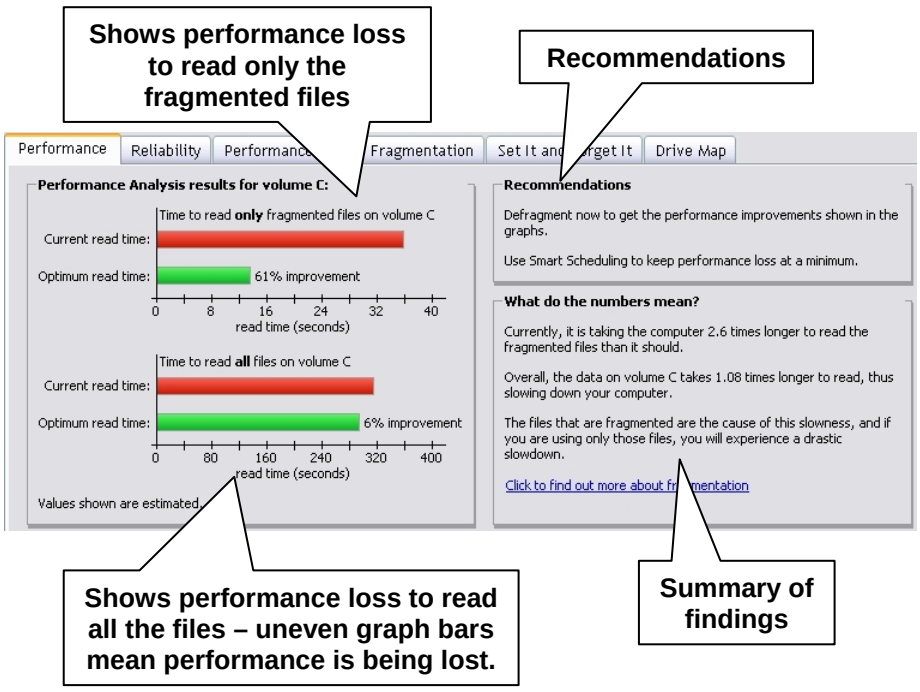
Using the Performance pane, you can see at a glance how much disk performance is being lost to fragmentation, and equally important, you can confirm that Diskeeper is keeping your disk performance at peak levels.

Here is an example of the Performance pane before running an analysis or defragmentation:

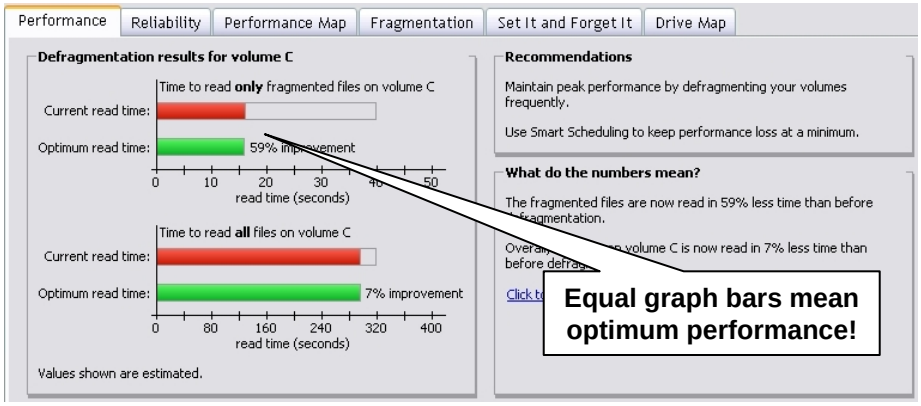

Performance
Reliability
Performance Map
Fragmentation
Set It and Forget It
Drive Map
To find out how fragmented files are affecting your machine's performance:
1. Select a volume from the list above.
2. Click "Analyze selected drive" from the menu on the left.
3. Click "Start".
Diskeeper will determine the lost performance on the volume by analyzing how long it takes to read the volume in its current state, and how long it will take to read the volume once the files have been defragmented.
You will see how much the performance of your computer is being degraded, and using Diskeeper, you will be able to regain the lost performance and keep it that way for the life of your computer.
Understanding the problem of fragmentation
Fragmentation means that the pieces of a file are scattered all over the disk, making it difficult for the computer to access the file. The more pieces a file is in, the more difficult that file is to access. Also, when many files are fragmented, the computer will become much slower, making common tasks like opening e-mail and pictures take longer.
Diskeeper not only finds out how badly the files are fragmented, but it finds out how much your computer is slowed down because of it. More importantly, Diskeeper can eliminate the fragmentation on the volume, and keep it eliminated without you having to do anything.
Click to find out more about fragmentation

Read the screen—it tells you how to get started analyzing your disks, and explains the effects of fragmentation.

After you've analyzed a fragmented disk volume, the Performance pane takes on a new look. Here's an example:


Shows performance loss to read only the fragmented files
Recommendations
Performance
Reliability
Fragmentation
Drive Map
Performance Analysis results for volume C:
Time to read only fragmented files on volume C
Current read time:
Optimum read time:
61% improvement
0 8 16 24 32 40
read time (seconds)
Time to read all files on volume C
Current read time:
Optimum read time:
6% improvement
0 80 160 240 320 400
read time (seconds)
Values shown are estimated.
Recommendations
Defragment now to get the performance improvements shown in the graphs.
Use Smart Scheduling to keep performance loss at a minimum.
What do the numbers mean?
Currently, it is taking the computer 2.6 times longer to read the fragmented files than it should.
Overall, the data on volume C takes 1.08 times longer to read, thus slowing down your computer.
The files that are fragmented are the cause of this slowness, and if you are using only those files, you will experience a drastic slowdown.
Shows performance loss to read all the files – uneven graph bars mean performance is being lost.
Summary of findings

After the fragmented disk has been defragmented by Diskeeper, the Performance pane helps show the real gain from defragmentation. Here's an example:


Performance
Reliability
Performance Map
Fragmentation
Set It and Forget It
Drive Map
Defragmentation results for volume C
Time to read only fragmented files on volume C
Current read time:
Optimum read time:
59% improvement
0 10 20 30 40 50
read time (seconds)
Time to read all files on volume C
Current read time:
Optimum read time:
7% improvement
0 80 160 240 320 400
read time (seconds)
Values shown are estimated.
Recommendations
Maintain peak performance by defragmenting your volumes frequently.
Use Smart Scheduling to keep performance loss at a minimum.
What do the numbers mean?
The fragmented files are now read in 59% less time than before
Equal graph bars mean optimum performance!

All the information on the Performance pane is dynamic—it changes based on the condition of the disk.

The Reliability Pane

The Reliability pane gives a reliability analysis and rating, the reasons for that rating, and recommendations for improving or maintaining the reliability of the disk volume.

Executive Software has done extensive research into the causes of disk performance and reliability problems. This research has shown these factors play a significant role in regards to disk performance and reliability:

- Overall fragmentation[1]
- MFT fragmentation
- Paging file fragmentation
- Available free space

Diskeeper uses these factors to determine a disk reliability index each time it analyzes or defragments a disk volume.

Disk reliability is rated into three categories—Healthy, Warning and Critical.

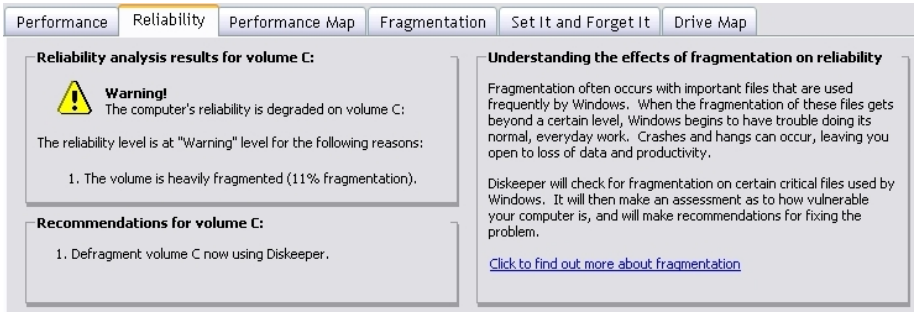
This table shows the Warning and Critical levels used in determining the reliability index.

Reliability Factor	Warning Level	Critical Level
Overall Fragmentation	> 10% fragmentation	> 50% fragmentation
MFT Fragmentation	> 250 fragments	>2000 fragments
Paging File Fragmentation	> 250 fragments	>1500 fragments
Free Space	< 15% free space	< 5% free space

The Reliability pane displays information for a single disk volume at a time. The disk highlighted in the disk volume pane is the disk shown in the Reliability pane.

Here is an example of the Reliability pane view after analysis of a disk that needs corrective action:

[1] Overall fragmentation is calculated by dividing the time required to read the fragmented files on the volume by the time required to read all the files on the volume, and multiplying the result by 100.


Performance
Reliability
Performance Map
Fragmentation
Set It and Forget It
Drive Map
Reliability analysis results for volume C:
Warning!
The computer's reliability is degraded on volume C:
The reliability level is at "Warning" level for the following reasons:
1. The volume is heavily fragmented (11% fragmentation).
Recommendations for volume C:
1. Defragment volume C now using Diskeeper.
Understanding the effects of fragmentation on reliability
Fragmentation often occurs with important files that are used frequently by Windows. When the fragmentation of these files gets beyond a certain level, Windows begins to have trouble doing its normal, everyday work. Crashes and hangs can occur, leaving you open to loss of data and productivity.
Diskeeper will check for fragmentation on certain critical files used by Windows. It will then make an assessment as to how vulnerable your computer is, and will make recommendations for fixing the problem.
Click to find out more about fragmentation

After analyzing a disk, the Reliability pane shows reliability index and the reasons behind it, and offers suggestions for correcting any problems found. In this example, the reliability analysis for drive C shows a high fragmentation level, warranting a “Warning” rating.

Now here’s an example of the Reliability pane after defragmentation, showing a disk in good condition:

Performance
Reliability
Performance Map
Fragmentation
Set It and Forget It
Drive Map
Defragmentation results for volume C:
Healthy
The computer's reliability is not currently affected by fragmentation on volume C: due to the low level of fragmentation.
Recommendations for volume C:
Continue to keep fragmentation under control using Set It and Forget It.
Click to find out more about fragmentation

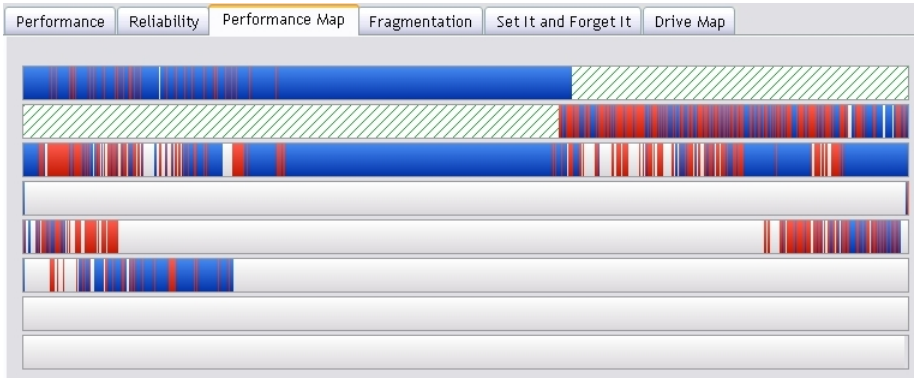
Notice that after defragmentation, the Reliability pane again shows the reliability index, but it changes to show the current condition of the disk. Recommendations for maintaining the condition of the disk (or for further improvement, if necessary) are also shown.

Like the Performance pane, the information shown in the Reliability pane is dynamic, changing as the conditions on your disks change.

Performance Map Pane

The Performance Map pane gives a view of the fragmentation on your disk volume with an emphasis on the performance impact of that fragmentation. See below for an example of a typical Performance Map pane display. (This example shows a moderately fragmented volume).

The Performance Map pane displays information for a single disk volume at a time. The disk highlighted in the disk volume pane is the disk reflected in the Performance Map pane.



What the Colors Mean

The group of horizontal bars in the Performance Map pane gives a graphic representation of the fragmentation of your disk volume (similar to the Drive Map pane, discussed later in this chapter), with one major difference: It shows the extent of performance degradation on the disk instead of simply showing the fragmented files.

For example, a large file in two or three fragments causes no significant performance loss. In this case, the Drive Map tab would display this file in red (since it is fragmented) but the Performance Map would display the same file in blue (since it is not affecting the performance of your computer). The Performance Map tab gives you a more accurate look at the condition of the disk as it relates to the overall performance of your system.

The Performance Map pane gives a graphic representation of the performance of your disk volume. The colors of the display indicate the type and condition of the data on your volume.

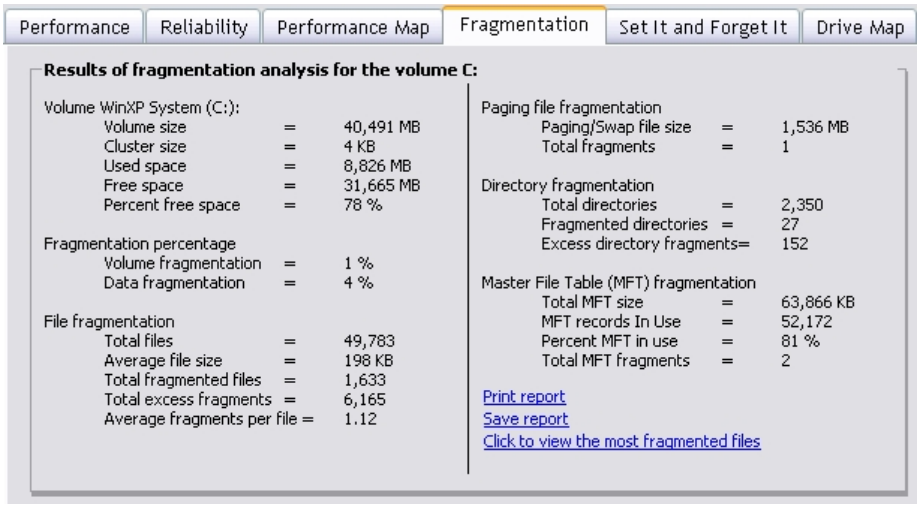
- Red areas show low-performing files.
- Pink areas show low-performing system files
- Dark blue areas show high-performing files.
- White areas show free space on the volume.
- Green-striped areas (on Windows 2000 and Windows XP systems only) show space on the volume reserved for expansion of the MFT. This space is reserved when a volume is formatted, and cannot be used by applications, including Diskeeper. However, the operating system will write files to this area when the volume becomes extremely full and no other free space is available. Windows provides the capability for Diskeeper to move files out of this reserved area, but on Windows 2000 does not allow Diskeeper to move files into it. These areas appear only on NTFS volumes.

The Fragmentation Pane

The Fragmentation pane shows useful information about your disk volume after either analysis or defragmentation. Note that most of the information shown in the Fragmentation pane can also be recorded in the Diskeeper Event Log. For more information, see *Logging Diskeeper Activity* on page 44.

The Fragmentation pane displays information for a single disk volume at a time. The disk highlighted in the disk volume pane is the disk shown in the Fragmentation pane.

Here is an example of the Fragmentation pane after analyzing a disk volume:


Performance
Reliability
Performance Map
Fragmentation
Set It and Forget It
Drive Map
Results of fragmentation analysis for the volume C:
Volume WinXP System (C:):
Volume size = 40,491 MB
Cluster size = 4 KB
Used space = 8,826 MB
Free space = 31,665 MB
Percent free space = 78 %
Fragmentation percentage
Volume fragmentation = 1 %
Data fragmentation = 4 %
File fragmentation
Total files = 49,783
Average file size = 198 KB
Total fragmented files = 1,633
Total excess fragments = 6,165
Average fragments per file = 1.12
Paging file fragmentation
Paging/Swap file size = 1,536 MB
Total fragments = 1
Directory fragmentation
Total directories = 2,350
Fragmented directories = 27
Excess directory fragments= 152
Master File Table (MFT) fragmentation
Total MFT size = 63,866 KB
MFT records In Use = 52,172
Percent MFT in use = 81 %
Total MFT fragments = 2
Print report
Save report
Click to view the most fragmented files

The Fragmentation pane shows this information:

Volume Section

Volume Size

This section of the Fragmentation pane or event log entry shows the total amount of space on the disk volume. This includes files and free space, as well as disk space used by the operating system (such as directory files and the Master File Table) but not reported in “Used Space.”

Cluster Size

This section of the Fragmentation pane or event log entry shows the cluster size for the volume. A disk cluster represents a number of disk sectors treated as a single unit. The entire disk is divided into clusters, each one a minimum increment of storage.

Used Space

This section of the Fragmentation pane or event log entry shows the total amount of disk space (in kilobytes) currently occupied by files. This does not include zero-length files, or certain files used by the operating system, such as directory files and the Master File Table.

Free Space

This section of the Fragmentation pane or event log entry shows the total amount of free space on the disk volume.

Percent Free Space

This section of the Fragmentation pane or event log entry shows the percentage of space on the disk volume that is free. This includes the free space in the area reserved for the Master File Table (MFT) on NTFS volumes.

Fragmentation Percentage Section

Volume Fragmentation

This section of the Fragmentation pane or event log entry shows the overall percentage of fragmentation on the disk volume.

The Volume fragmentation figure gives you an overall view of the fragmentation on your volume, by taking both the file fragmentation level and the free space fragmentation level into account. These two values are weighted depending on the ratio of free space to used space on the disk. The formula is:

*Fragmented space on the volume * 100 / Total space on the volume*

Where *Fragmented space on the volume* is the summed cluster count of all fragmented files times the bytes per clusters.

Data Fragmentation

This section of the Fragmentation pane or event log entry shows the percentage of file fragmentation on the disk volume.

Data fragmentation is calculated like this:

*Volume Fragmentation * Total Space on the Volume / Used Space on the volume*

Note: The calculations are for both Data fragmentation and Volume fragmentation are done based on the uncompressed size of the files. If a volume has a large number of fragmented compressed files, these values can exceed 100%. This is similar to looking at files in Windows Explorer—if a large number of files are compressed, the total size of the data can exceed the volume size. This is why you can compare the volume size in Disk Management to the total number of bytes on a volume, and they don’t “add up”.

File Fragmentation Section

Total Files

This section of the Fragmentation pane or event log entry shows the total number of files on the disk volume. This number does not include zero-length files or (in most cases) files less than one cluster in size on NTFS volumes. Files less than one cluster in size may be included, depending on the file size and the cluster size.

Average File Size

This section of the Fragmentation pane or event log entry shows the average size of all the files on the disk volume. This number does not include any zero-length files or paging files.

Total Fragmented Files

This section of the Fragmentation pane or event log entry shows the total number of fragmented files on the disk volume.

Total Excess Fragments

This section of the Fragmentation pane or event log entry shows the total number of file fragments on the disk volume. Contiguous files are not counted in this total, but each additional piece of any fragmented file *is* counted.

Average Fragments per File

This section of the Fragmentation pane or event log entry shows the average number of fragments per file on the disk volume. This is a good index of how fragmented the files on the volume are.

If the average fragment per file figure is 1.00, the files are contiguous. If the figure is 1.10, then 10% of the files, on average, are in two pieces. 1.20 means 20%, 1.30 means 30%, etc. A figure of 2.00 means the files average two fragments each. 1.00 is the best figure attainable, indicating that all files or nearly all files are contiguous.

Paging File Fragmentation Section

Paging/Swap File Size

This section of the Fragmentation pane or event log entry shows the size of the paging file (or swap file on Windows 95/98/Me systems) on the disk volume. This section displays zero when no paging file is present.

Total Fragments

This section of the Fragmentation pane or event log entry shows the number of fragments the paging file is broken into (if it exists on the disk volume).

Directory Fragmentation Section

Total Directories

This section of the Fragmentation pane or event log entry shows the total number of directories present on the disk volume.

Fragmented Directories

This section of the Fragmentation pane or event log entry shows the number of fragmented directories on the disk volume.

Excess Directory Fragments

This section of the Fragmentation pane or event log entry shows the total number of directory fragments on the disk volume. Contiguous directories are not counted in this total, but each additional piece of any fragmented directory is counted.

Master File Table (MFT) Fragmentation Section

Total MFT Size

This section of the Fragmentation pane or event log entry shows the size of the Master File Table (MFT).

Since the MFT is only used on NTFS volumes, this section is not displayed for FAT volumes in the text analysis display, and shows as zeros in the event log.

MFT Records in Use

This section of the Fragmentation pane or event log entry shows the number of individual file records found in the Master File Table (MFT). This figure will not necessarily correspond with the number of files presently on the volume, since the file records remain in the MFT, even after a file is deleted.

Since the MFT is only used on NTFS volumes, this section is not displayed on FAT volumes.

Percent of MFT In Use

This section of the Fragmentation pane or event log entry shows the percentage of the Master File Table (MFT) in use.

The MFT grows as the number of files on the volume increases, but is not reduced in size when files are deleted from the volume.

Since the MFT is only used on NTFS volumes, this section is not displayed on FAT volumes.

Total MFT Fragments

This section of the Fragmentation pane or event log entry shows the number of fragments the Master File Table (MFT) is broken into.

Since the MFT is only used on NTFS volumes, this section is not displayed on FAT volumes.

Most Fragmented Files

Click the **…most fragmented files** link at the bottom of the Fragmentation pane to show a list of the most fragmented files on the disk volume. For each fragmented file listed, this option shows:

Fragments

Shows the number of fragments associated with the most fragmented files on your disk volume.

File Size

Shows the size of the most fragmented files on your disk volume.

File Name

Shows the names of the most fragmented files on your volume.

If these files are ones that users access frequently, the impact to your system performance may be worse than indicated by the Average Fragments per File figure.

In addition to the names of the most fragmented files, the Most Fragmented Files report also shows information explaining reasons why certain files were not moved or defragmented. The following “tags” may be added to specific filenames in the Most Fragmented Files listing:

Tag	Displayed After	File System	Description
[Cannot Open]	Defragmentation Only	NTFS and FAT	This file cannot be opened (and thus moved) by Diskeeper. This is often the result of the access controls (permissions) on the file being set to prevent Diskeeper from accessing it. File permissions must allow SYSTEM to have full control of a file in order for Diskeeper to defragment it.
[Excluded]	Defragmentation Only	NTFS and FAT	This file is listed on one of the Diskeeper exclusion lists. This can be either the user-specified exclusion list or the internal exclusion list.
[Excess Allocation]	Analysis and Defragmentation	NTFS Only	With the NTFS file system, a file can be allocated more clusters than its data is actually using. On Windows 2000, only the data portion of the allocation can be defragmented. As a result, even though a file is reported as fragmented, the data portion of the file may in fact be contiguous. This most commonly occurs with registry files and (under Windows 2000) files that have been decompressed. In some cases, files of this type can be defragmented after a system restart
[Partially Defragmented]	Defragmentation Only	NTFS and FAT	This file has been partially defragmented. Its fragments have been reduced in number, but the file is not yet contiguous.

Saving a Fragmentation Report

Click the **Save report** link at the bottom of the Fragmentation pane to save the fragmentation report to a text file. When you click the link, a dialog box is displayed allowing you to specify the name of the report and the location where you want to store it.

The saved report shows all the information available from the Fragmentation pane.

Printing a Fragmentation Report

Click the **Print report** link at the bottom of the Fragmentation pane to print the fragmentation report. When you click the link, a dialog box is displayed allowing you to specify the printer on which you want to print the report.

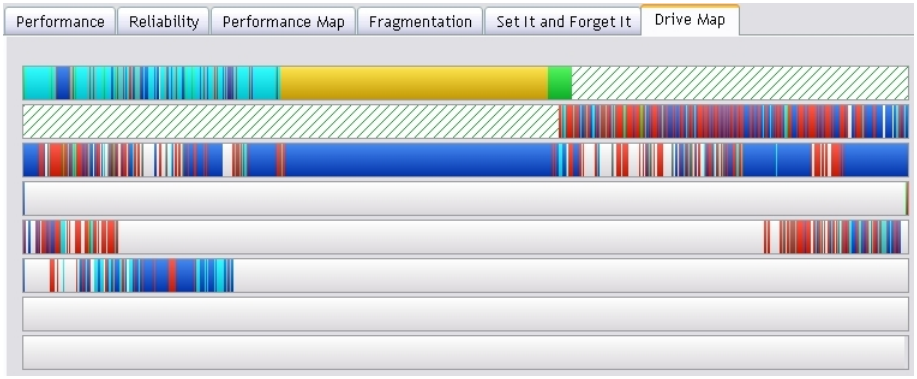
The printed report shows all the information available from the Fragmentation pane.

Drive Map Pane

Like the Performance Map pane, the horizontal bars in the Drive Map pane give a graphic representation of the fragmentation of your disk volume. The Drive Map pane shows additional detail, including the paging file (if it exists) and other system files like the MFT on NTFS volumes. It also shows all the fragmentation (even fragmented file that are not affecting your system's performance).

The example below shows an example of a typical Drive Map pane display. (This example shows a moderately fragmented volume).

The Drive Map pane displays information for a single disk volume at a time. The disk highlighted in the disk volume pane is the disk reflected in the Drive Map pane.



What the Colors Mean

The group of horizontal bars in the Drive Map pane gives a graphic representation of the fragmentation of your disk volume. The colors of the display indicate the type and condition of the data on your volume.

- Red areas show fragmented files.
- Dark blue areas show contiguous (non-fragmented) files.
- White areas show free space on the volume.
- Light blue areas show the directory folders on the volume (and their fragments).
- Green areas show unmovable system files. On Windows NT, Windows 2000, Windows XP, and Windows Server 2003 systems, green areas particularly show the Master File Table (MFT), but also several other unmovable files. These files cannot be moved safely by Diskeeper (or any other defragmenter), except at boot-time. Note that boot-time defragmentation is not available with Diskeeper Home Edition. Keep in mind, however, although these area are referred to as "system files", these are not the files that make up the operating system (which Diskeeper can successfully defragment online). Instead, they make up the NTFS file system. The green areas of the display appear only on NTFS volumes.
- Green-striped areas (on Windows NT, Windows 2000, Windows XP, and Windows Server 2003 systems only) show space on the volume reserved for expansion of the MFT. This space is reserved when a volume is formatted, and cannot be used by applications, including Diskeeper. However, the operating system will write files to this area when the volume becomes extremely full and no other free space is available. Windows provides the capability for Diskeeper to move files out of this reserved area, but does not allow Diskeeper to move files into it. These areas appear only on NTFS volumes.
- Yellow areas show the paging file (for Windows NT, Windows 2000, Windows XP, and Windows Server 2003) or the swap file (for Windows 95/98/Me) if it exists on the volume.

Set It and Forget It Pane

The “Set It and Forget It” feature allows Diskeeper to run automatically in the background while users and other processes are active on the system. The Set It and Forget It pane shows the details about any schedules you have set, and it’s where you set custom defragmentation schedules for your disk volumes.

A defragmentation schedule specifies the times or days of the week that Diskeeper will (or will not) be allowed to run. Most Diskeeper editions provide for two types of schedules—primary and secondary—allowing you to assign up to two schedules per disk volume.

Note: Secondary schedules are not available with Diskeeper Home Edition.

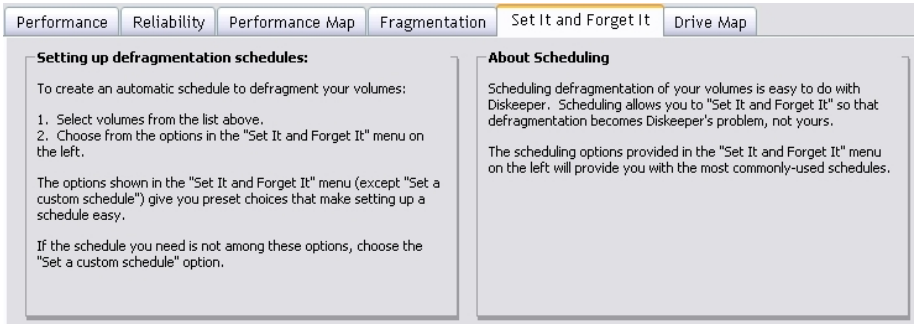
You can specify separate defragmentation schedules for individual disk volumes, or you can create a single schedule for more than one volume.

Click the **Set It and Forget It** option in the Command pane to pick from one of several commonly-used schedules, or to create a custom schedule of times when “Set It and Forget It” defragmentation jobs will be forced to run (or times they will not be allowed to run). When you click the **Set It and Forget It** option, the Set It and Forget It pane is displayed.

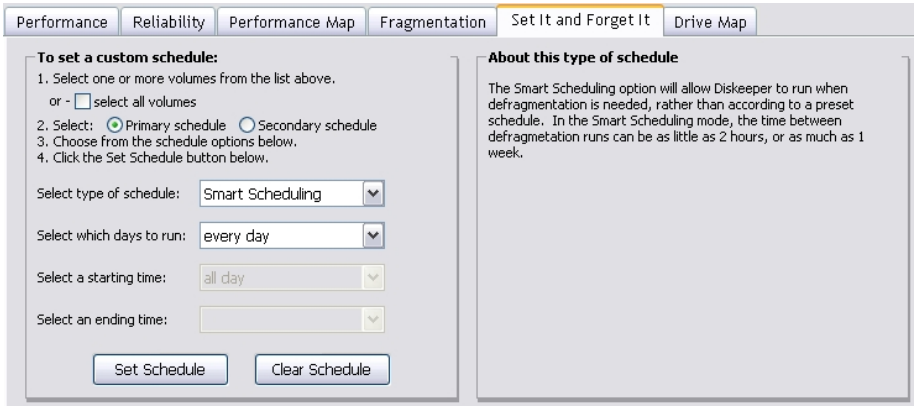
Schedules only affect “Set It and Forget It” defragmentation jobs. Any active defragmentation job previously started on a disk volume will complete. After it completes, the new schedule takes effect.

When you use the Set It and Forget It pane, always select one or more volumes in the disk volume pane before clicking any of the other Set It and Forget It controls. You can select more than one volume by holding the CTRL key while clicking on the volumes listed in the disk volume pane.

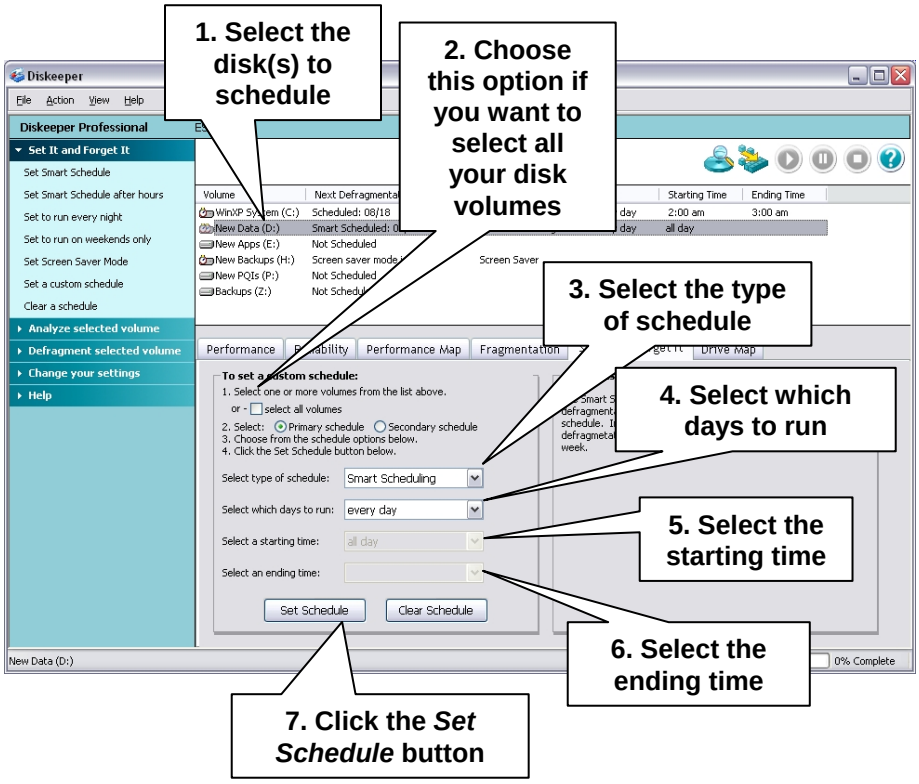
Here is an example of the Set It and Forget It pane when you first start Diskeeper:


Performance
Reliability
Performance Map
Fragmentation
Set It and Forget It
Drive Map
Setting up defragmentation schedules:
To create an automatic schedule to defragment your volumes:
1. Select volumes from the list above.
2. Choose from the options in the "Set It and Forget It" menu on the left.
The options shown in the "Set It and Forget It" menu (except "Set a custom schedule") give you preset choices that make setting up a schedule easy.
If the schedule you need is not among these options, choose the "Set a custom schedule" option.
About Scheduling
Scheduling defragmentation of your volumes is easy to do with Diskeeper. Scheduling allows you to "Set It and Forget It" so that defragmentation becomes Diskeeper's problem, not yours.
The scheduling options provided in the "Set It and Forget It" menu on the left will provide you with the most commonly-used schedules.

And here’s an example after choosing the **Set a custom schedule** option from the Set It and Forget It menu:


Performance
Reliability
Performance Map
Fragmentation
Set It and Forget It
Drive Map
To set a custom schedule:
1. Select one or more volumes from the list above.
or - select all volumes
2. Select: Primary schedule Secondary schedule
3. Choose from the schedule options below.
4. Click the Set Schedule button below.
Select type of schedule: Smart Scheduling
Select which days to run: every day
Select a starting time: all day
Select an ending time:
Set Schedule
Clear Schedule
About this type of schedule
The Smart Scheduling option will allow Diskeeper to run when defragmentation is needed, rather than according to a preset schedule. In the Smart Scheduling mode, the time between defragmetation runs can be as little as 2 hours, or as much as 1 week.

Setting a custom schedule for one or more disks is easy. Here are the basic steps after clicking **Set It and Forget It** in the Command pane and selecting **Set a custom schedule**:


1. Select the disk(s) to schedule
2. Choose this option if you want to select all your disk volumes
3. Select the type of schedule
4. Select which days to run
5. Select the starting time
6. Select the ending time
7. Click the *Set Schedule* button
Diskeeper
Diskeeper Professional
Set It and Forget It
Set Smart Schedule
Set Smart Schedule after hours
Set to run every night
Set to run on weekends only
Set Screen Saver Mode
Set a custom schedule
Clear a schedule
Analyze selected volume
Defragment selected volume
Change your settings
Help
Performance
Fragmentation
Performance Map
Drive Map
To set a custom schedule:
1. Select one or more volumes from the list above.
or - select all volumes
2. Select: Primary schedule Secondary schedule
3. Choose from the schedule options below.
4. Click the Set Schedule button below.
Select type of schedule: Smart Scheduling
Select which days to run: every day
Select a starting time: all day
Select an ending time:
Set Schedule
Clear Schedule
New Data (D:)
0% Complete

The following controls are available in the Set It and Forget It pane:

Primary schedule / Secondary schedule

Since Diskeeper Home Edition does not provide for secondary schedules, this option is not enabled. You can only set a primary schedule with Diskeeper Home Edition.

Select type of schedule

Use this section of the Set It and Forget It pane to specify how often Diskeeper should run on the selected disk volumes. You can specify any of these run frequencies:

One Time
Continuously
Every 2 hours
Every 4 hours
Every 8 hours
Every 12 hours
Every 24 hours
Every 48 hours
Every 72 hours
Smart Scheduling (see the description of Smart Scheduling later in this chapter)
Screen Saver (see the description of Screen Saver mode later in this chapter)

Select which days to run

Use this section of the Set It and Forget It pane to specify days the Diskeeper job will (or will not) be allowed to run on the selected volumes. You can specify any of these time periods to control when Diskeeper is allowed to run:

Everyday	Except Everyday
Weekends	Except Weekends
Weekdays	Except Weekdays
Mondays	Except Mondays
Tuesdays	Except Tuesdays
Wednesdays	Except Wednesdays
Thursdays	Except Thursdays
Fridays	Except Fridays
Saturdays	Except Saturdays
Sundays	Except Sundays

Select a starting time

Use this section of the Set It and Forget It pane to specify the beginning of a time period the Diskeeper job will (or will not) be allowed to run on the selected volumes. You can specify any of these time periods to specify the beginning of a Diskeeper schedule period:

All Day

12:00 midnight through 11:00 P.M., in one hour increments

Select an ending time

Use this section of the Set It and Forget It pane to specify the end of a time period the Diskeeper job will (or will not) be allowed to run on the selected volumes. You can specify any of these time periods to specify the end of a time period Diskeeper will (or will not) be allowed to run:

12:00 midnight through 11:00 P.M., in one hour increments

Set Schedule

Click **Set Schedule** to accept the specified run schedule for the selected volumes. You must click **Set Schedule** for each schedule you specify.

Any defragmentation job previously started on a volume will complete the current run through the volume before the new schedule takes effect.

Clear Schedule

Click **Clear Schedule** to clear the currently active Set It and Forget It defragmentation schedule on the selected volumes. If Diskeeper is in the process of defragmenting a volume at the time the **Clear Schedule** button is clicked, it will run to completion.

Smart Scheduling

By default, Diskeeper Home Edition enables Smart Scheduling automatically on all your disk volumes. With Smart Scheduling, you no longer have to decide how often to defragment your disks—Diskeeper will automatically determine the optimum defragmentation schedule for each of your disk volumes and adjust it accordingly.

The method used to determine how often Diskeeper should run is elegant in its simplicity. When Smart Scheduling is enabled, Diskeeper keeps track of the number of files moved every time it runs on each disk volume. When the number of fragmented files moved during a defragmentation run increases, Diskeeper is automatically scheduled to run more often. When the number of files moved decreases, the time between defragmentation runs is increased.

The Smart Scheduling option is available within the **Select type of schedule** drop-down list in the Set It and Forget It pane.

You can also set exclusion times when the Smart Scheduling option will be prevented from scheduling a defragmentation run. When Smart Scheduling is selected, the **Select which days to run** drop-down option list will be limited to these times:

Except Everyday
Except Weekends
Except Weekdays
Except Monday
Except Tuesday
Except Wednesday
Except Thursday
Except Friday
Except Saturday
Except Sunday

You can use the “starting” and “ending” time drop down lists to further define times when the scheduling of automatic defragmentation runs will not be allowed. For example, a schedule set like this:

Type of Schedule	Which Days
Smart Scheduling	Except Weekdays
Starting Time	**Ending Time**
1:00 am	3:00 am

will allow Diskeeper to automatically determine how often to run, but will also prevent it from running between 1:00 am and 3:00 am on weekdays (i.e., when your nightly backup is running).

Here’s another example, showing a Smart Schedule that will run everyday, but only between the hours of 7:00 pm and 7:00 am:

Type of Schedule	Which Days
Smart Scheduling	everyday
Starting Time	**Ending Time**
7:00 pm	7:00 am

Tip: The **Set It and Forget It** option on the Command pane includes several commonly-used defragmentation schedules, pre-configured and ready to use. See page 35 for more information about the Set It and Forget It option in the Command pane.

Screen Saver Mode

When enabled, Screen Saver mode automatically starts defragmenting the selected disk volume(s) any time the screen saver starts on your computer. The defragmentation operation is paused whenever keyboard or mouse activity is detected on the computer. This option is available under the **Select type of schedule** drop-down list in the Set It and Forget It pane. Note that you must have a screen saver enabled for this option to function.

If you only have a single disk volume selected for Screen Saver mode, the defragmentation operation is re-started at the logical "beginning" of the volume each time the screen saver re-starts after being interrupted (by keyboard activity, for example).

When more than one disk volume is selected for Screen Saver mode, the volumes are handled in a round-robin manner. If a defragmentation pass is stopped, the operation resumes on the next volume when the screen saver starts again. For example, if you select volumes C and D for Screen Saver mode, when your screen saver starts, Diskeeper begins a defragmentation pass on volume C. If that pass is interrupted, and then the screen saver starts again, Diskeeper will begin a pass on volume D.

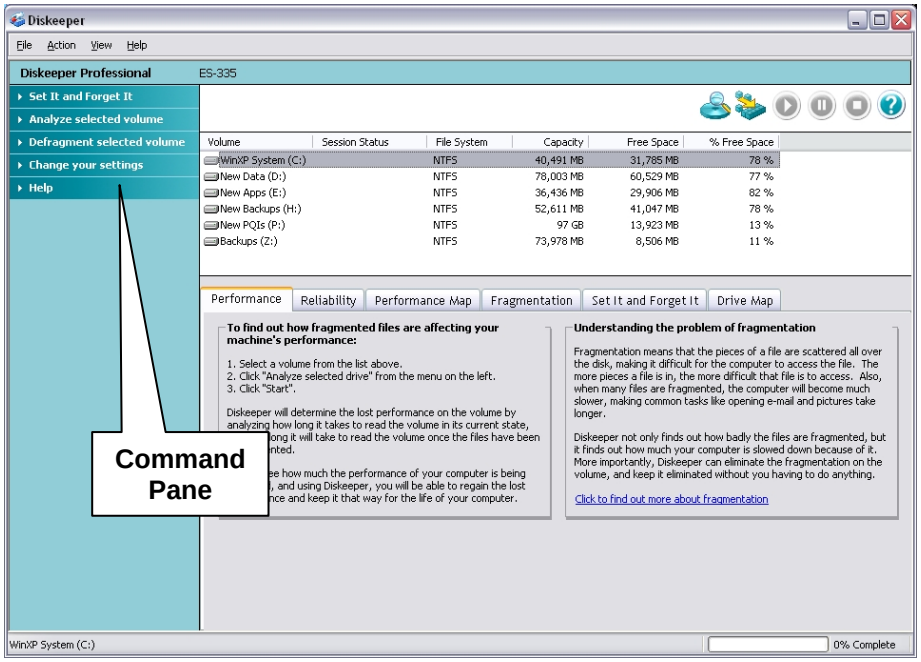
If the screen saver has not been interrupted after Diskeeper completes the defragmentation pass on each of the selected disk volumes, Diskeeper is automatically scheduled to re-start the defragmentation operation in one hour.

Because of the "start and stop" nature of the Screen Saver mode, it is not recommended on disk volumes that are heavily fragmented, unless you expect the computer's screen saver to be on for several hours. In cases where your screen saver activity is only for short periods of time, a thorough manual defragmentation or scheduled Set It and Forget It defragmentation should be performed before running Diskeeper in Screen Saver mode.

Note: Screen Saver mode is not recommended for servers. Many servers spend a good deal of time with the screen saver active, which could cause Diskeeper to run more often than necessary. This can cause unnecessary system resource use on the server at times when it is under heavy demand.

Command Pane

The Command pane is where you'll find easy access to the commonly-used Diskeeper features, as well as several shortcuts for performing common tasks.

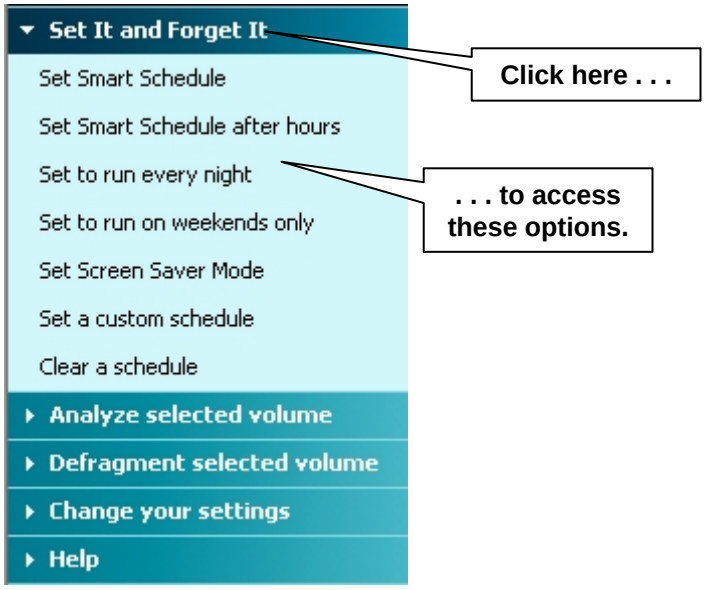

Diskeeper
File Action View Help
Diskeeper Professional ES-335
Set It and Forget It
Analyze selected volume
Defragment selected volume
Change your settings
Help
Volume Session Status File System Capacity Free Space % Free Space
WinXP System (C:) NTFS 40,491 MB 31,785 MB 78 %
New Data (D:) NTFS 78,003 MB 60,529 MB 77 %
New Apps (E:) NTFS 36,436 MB 29,906 MB 82 %
New Backups (H:) NTFS 52,611 MB 41,047 MB 78 %
New PQIs (P:) NTFS 97 GB 13,923 MB 13 %
Backups (Z:) NTFS 73,978 MB 8,506 MB 11 %
Performance Reliability Performance Map Fragmentation Set It and Forget It Drive Map
To find out how fragmented files are affecting your machine's performance:
1. Select a volume from the list above.
2. Click "Analyze selected drive" from the menu on the left.
3. Click "Start".
Understanding the problem of fragmentation
Fragmentation means that the pieces of a file are scattered all over the disk, making it difficult for the computer to access the file. The more pieces a file is in, the more difficult that file is to access. Also, when many files are fragmented, the computer will become much slower, making common tasks like opening e-mail and pictures take longer.
Diskeeper not only finds out how badly the files are fragmented, but it finds out how much your computer is slowed down because of it. More importantly, Diskeeper can eliminate the fragmentation on the volume, and keep it eliminated without you having to do anything.
Click to find out more about fragmentation
Command Pane
WinXP System (C:)
0% Complete

The Command pane is made up of these parts:

- **Set It and Forget It Menu**—Gives you several pre-configured defragmentation schedules with just a few mouse clicks, or gives you the option to create your own custom schedules
- **Analyze Selected Volume**—Start the analysis of the drive selected in the disk volume pane
- **Defragment Selected Volume**—Start the manual defragmentation of the drive selected in the disk volume pane
- **Change Your Settings Menu**—Change Diskeeper settings
- **Help Menu**—Get help about using Diskeeper

Set It and Forget It Menu

Click the **Set It and Forget It** menu in the Command pane to expand it and reveal the different options available. Here's an example:


Set It and Forget It
Set Smart Schedule
Set Smart Schedule after hours
Set to run every night
Set to run on weekends only
Set Screen Saver Mode
Set a custom schedule
Clear a schedule
Analyze selected volume
Defragment selected volume
Change your settings
Help
Click here . . .
. . . to access these options.

Set Smart Schedule

Use this option to quickly set a Smart Schedule for any selected disk(s) in the disk volume pane. A Smart Schedule lets Diskeeper automatically determine when it should run on each disk. By default, Diskeeper Home Edition enables Smart Scheduling automatically on all your disk volumes. See page 35 for more information about Smart Scheduling.

Set Smart Schedule after hours

Similar to the Smart Scheduling option above, this option also quickly sets a Smart Schedule for any selected disk(s). However, this specialized schedule will only run after normal office hours. When set, this schedule will only allow defragmentation to run between 10:00 pm and 4:00 am. Keep in mind though, since this is a Smart Schedule, Diskeeper will only run as often as necessary to keep fragmentation minimized on the chosen disks.

Set to run every night

Use this option to quickly set a schedule that runs every 2 hours, but only between the hours of 10:00 pm and 4:00 am, for any selected disk(s) in the disk volume pane.

Set to run on weekends only

Use this option to quickly set a Smart Schedule, which runs only on Saturday and Sunday, for any selected disk(s) in the disk volume pane.

Set Screen Saver mode

Use this option to quickly set defragmentation to run only when the screen saver is active on your computer. Like the other options in the Set It and Forget It menu, when clicked, this option is set for any selected disk(s) in the disk volume pane. See page 34 for more information about Screen Saver mode.

Set a custom schedule

Use this option to set a custom schedule for any selected disk(s) in the disk volume pane. You can set the days and times when Diskeeper will (or will not) be allowed to run. See page 30 for more information about creating a custom schedule.

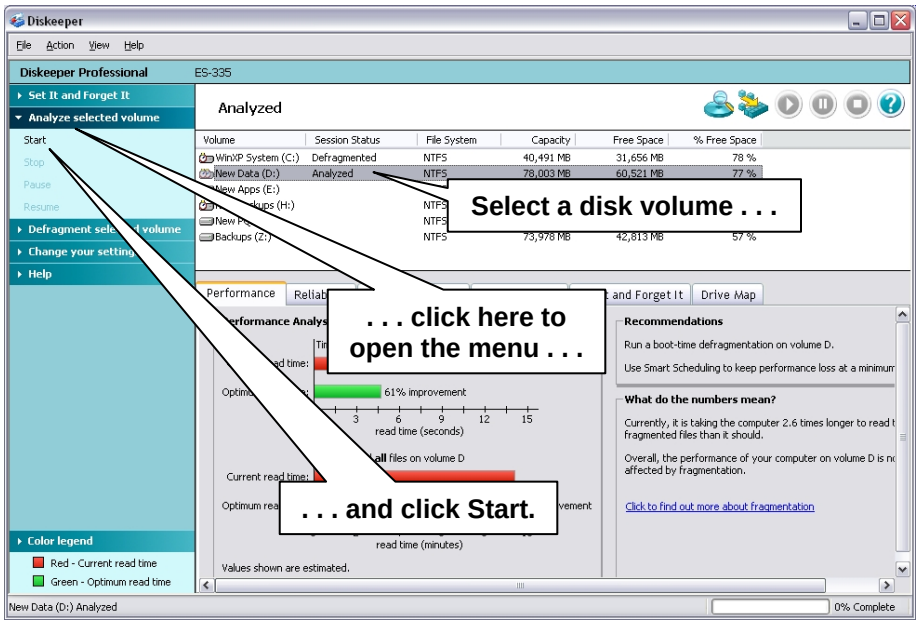
Clear a Schedule

Use this option to clear a previously-set schedule for any selected disk(s) in the disk volume pane. This option removes any schedule set for the selected volume(s), but any ongoing defragmentation jobs will continue until completion.

If you need to stop (but not clear) a scheduled defragmentation job when it is running, simply highlight the volume in the disk volume pane and click the **Stop** button in the toolbar.

Analyze Selected Volume

This option on the Command pane is self-explanatory—select a disk in the disk volume pane, then click **Analyze selected volume**, then **Start** in the Command pane to see the extent of fragmentation on the disk. After the analysis is complete, click the different tab controls in the Information pane to see the condition of the disk.

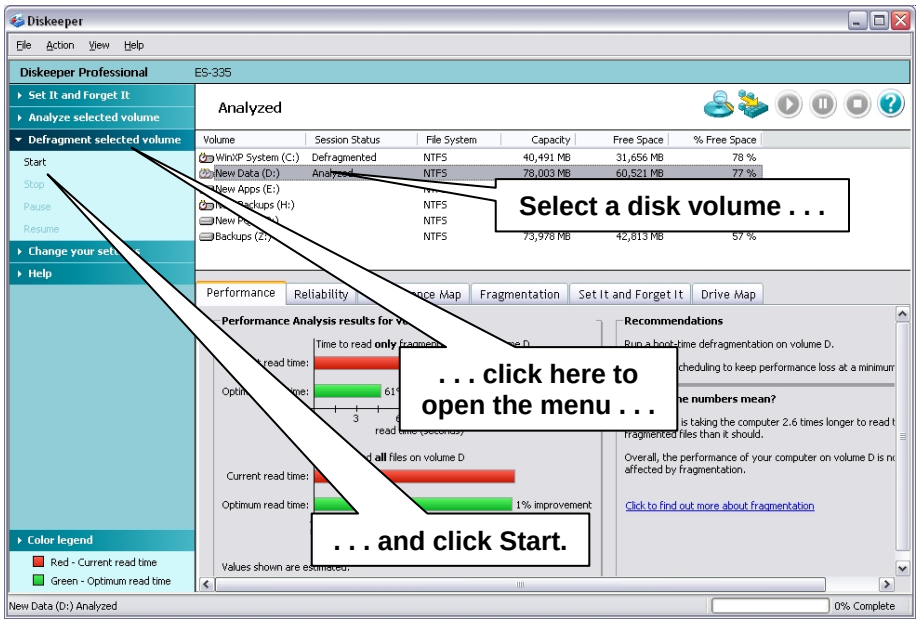


Tip: You can also use the Analyze button to start the analysis of the selected disk.

When you are analyzing a disk, the Command pane displays options to **Pause**, **Resume** or **Stop** the analysis. You can also perform these functions with the equivalent toolbar buttons.

Defragment Selected Volume

This option on the Command pane is also self-explanatory—select a disk in the disk volume pane, then click **Defragment selected volume** in the Command pane to run a manual defragmentation job on the disk. After the defragmentation is complete, click the different tab controls in the Information pane to review the condition of the disk.



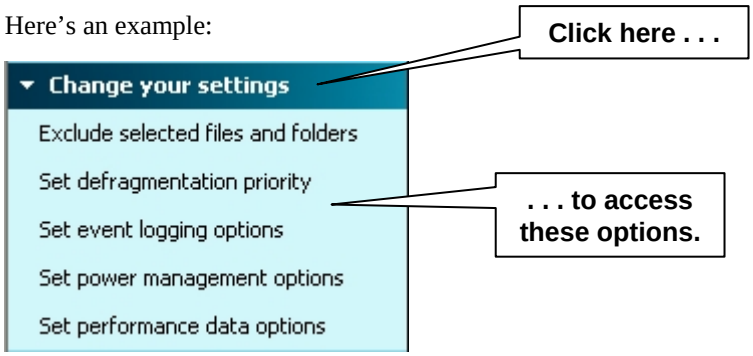
Tip: You can also use the Defragment button to start defragmenting the selected volume.

When you are defragmenting a disk, the Command pane displays options to **Pause**, **Resume** or **Stop** the defragmentation. You can also perform these functions with the equivalent toolbar buttons.

Change Your Settings Menu

Click the **Change your settings** menu in the Command pane to expand it and reveal the different options available.

Here's an example:


Click here . . .
Change your settings
Exclude selected files and folders
Set defragmentation priority
Set event logging options
Set power management options
Set performance data options
. . . to access these options.

Exclude selected files and folders

Diskeeper allows you to specify files and directory folders that you do not want moved. Click this option in the **Change your settings** menu to create or modify an exclusion list.

This option is also available from the Action menu. For more information about exclusion lists, see *Setting an Exclusion List* on page 41.

Set defragmentation priority

Click this option in the **Change your settings** menu to set I/O Smart settings for both “Set It and Forget It” and “Manual Defragmentation” jobs.

This option is also available from the Action menu. See *I/O Smart* on page 43 for more information about setting the Diskeeper priority in Diskeeper Home Edition.

Set event logging options

Diskeeper allows you to record information about its activity in a log file. Click this option in the **Change your settings** menu to alternately enable or disable the logging of various events to the Diskeeper Event Log. The logging method varies, depending on the version of Windows you are using.

This option is also available from the Action menu. For more information, see *Logging Diskeeper Activity* on page 44.

Set power management options

This option is intended for users of laptop or portable computers. When enabled, this option prevents Diskeeper from running when the computer switches to battery power. Click this option in the **Change your settings** menu to enable or disable this option.

This option is also available in the Action menu. For more information, see *Using Power Management* on page 44.

Set performance data options

Use this option to enable or disable the scanning your disk drives to gather disk performance data. When enabled, the scan runs one time on each disk volume detected, and runs any time a new disk volume detected on your computer. This option is disabled by default.

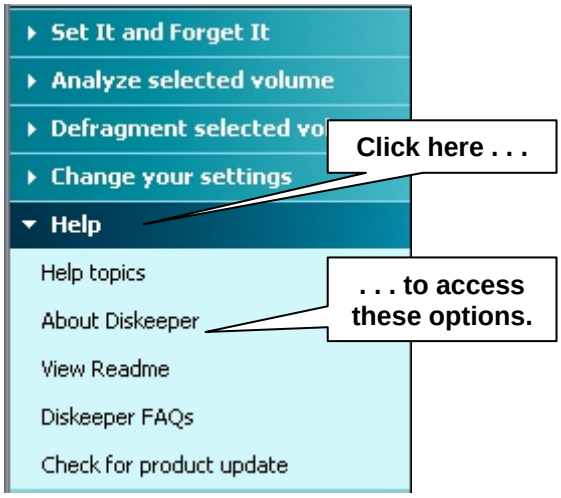
Diskeeper uses the data gathered during the performance data scan to measure the performance of each of your disk drives. It uses this information to determine how much performance you are losing due to fragmentation, and shows the results in the Performance pane when you run an analysis or defragmentation.

Allowing this scan to take place improves the accuracy of the performance data displayed by Diskeeper after the analysis or defragmentation of a disk. When this option is disabled, Diskeeper uses default disk performance values when calculating your performance loss due to fragmentation.

This performance scan may take as much as 1 to 10 minutes per volume to perform an accurate scan and may temporarily slow down your computer, but only while the scan is running.

Help Menu

Click the **Help** menu in the Command pane to expand it and see the different options available. Here’s an example:



Help Topics

Click this option to open the main Diskeeper Help system. The Diskeeper Help provides quick access to useful information about Diskeeper.

About Diskeeper

Click this option to see information about the specific version and build number of the Diskeeper version installed on your computer.

View Readme

Click this option to read the Diskeeper **Readme.txt** file. This file contains the most current information about the version of Diskeeper installed on your computer, and gives information that may not be included in the other published documentation. The Diskeeper Readme file contains late-breaking information that could not be included in other published documentation like this manual or the Diskeeper Help system.

Diskeeper FAQs

Click this option to see to a list of Frequently-Asked Questions (FAQs) about Diskeeper, and the answers to them.

Check for product update

Click this option to check for a more recent version of Diskeeper. If a newer version of Diskeeper is available, you are given the option of downloading it. When the download screen is displayed, click **Run this program from its current location** to begin installing the update.

Otherwise, click **Save this program to disk** to save the Diskeeper update installation package on your computer for later installation. (To install an update stored on your computer in this manner, simply double-click the file you download and follow the instructions displayed.)

Disk Volume Pane

The disk volume pane section of the Diskeeper display shows all the supported disks detected on your computer.

Volume	Session Status	File System	Capacity	Free Space	% Free Space
WinXP System (C:)	Defragmented	NTFS	40,491 MB	31,655 MB	78 %
New Data (D:)	Analyzed	NTFS	78,003 MB	60,520 MB	77 %
New Apps (E:)		NTFS	36,436 MB	29,877 MB	81 %
New Backups (H:)		NTFS	52,611 MB	36,378 MB	69 %
New PQIs (P:)		NTFS	97 GB	35,962 MB	35 %
Backups (Z:)	Stopped	NTFS	73,978 MB	42,813 MB	57 %

The disk volume pane is a quick way to see:

- Volume letter and name
- Session status (shows what Diskeeper is doing or has done on the volume)
- File system on the volume
- Capacity of the volume
- Free space available on the volume
- Percentage of volume size that is free space

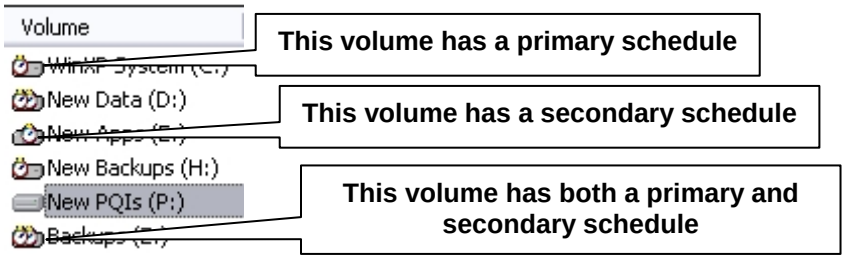
When you are viewing the Set It and Forget It pane, the columns in the disk volume pane change to shows different information:

Volume	Next Defragmentation	Schedule Type	Days	Starting Time	Ending Time
WinXP System (C:)	Scheduled: 08/18 2:01 am	continuously	every day	2:00 am	3:00 am
New Data (D:)	Smart Scheduled: 08/18 2:04 am	Smart Scheduling	every day	all day	
New Apps (E:)	Not Scheduled				
New Backups (H:)	Screen saver mode is set	Screen Saver			
New PQIs (P:)	Not Scheduled				
Backups (Z:)	Smart Scheduled: 08/18 2:34 am	Smart Scheduling	every day	all day	

- Volume letter and name
- Next scheduled defragmentation
- Schedule type
- Days
- Starting time
- Ending time

The icons in either view of the disk volume pane show which volumes have been scheduled with either primary or secondary schedules.

Note: Secondary schedules are not available with Diskeeper Home Edition. Only Primary schedules are shown.


Volume
New Data (D:)
New Backups (H:)
New PQIs (P:)
This volume has a primary schedule
This volume has a secondary schedule
This volume has both a primary and secondary schedule

Toolbar Buttons

By default, Diskeeper displays a toolbar of commonly-used controls above the disk volume pane. (The toolbar and other display components can be hidden by using the **Customize** option in the **View** menu.)

Note: Many of the functions described in this section can also be activated from the menu that appears when you right-click on a selected disk volume in the disk volume pane.

Analyze Button

Click **Analyze** in the Diskeeper toolbar, the **Analyze selected volume** option in the Command pane or on the Action menu to begin the analysis of the selected disk volume.

Defragment Button

Click **Defragment** in the Diskeeper toolbar, the **Defragment selected volume** option in the Command pane or the Action menu to start the manual defragmentation of the selected volume.

Pause Button

Click **Pause** in the Diskeeper toolbar or the **Pause** option in the Action menu to temporarily pause a fragmentation analysis or the manual defragmentation of the selected volume.

Resume Button

Click **Resume** in the Diskeeper toolbar or the **Resume** option in the Action menu to continue a paused Diskeeper analysis or defragmentation operation.

Stop Button

Click **Stop** in the Diskeeper toolbar or the **Stop** option in the Action menu to stop a fragmentation analysis or the manual defragmentation of the selected volume. Any file movement in progress will be safely ended as Diskeeper stops.

Help Button

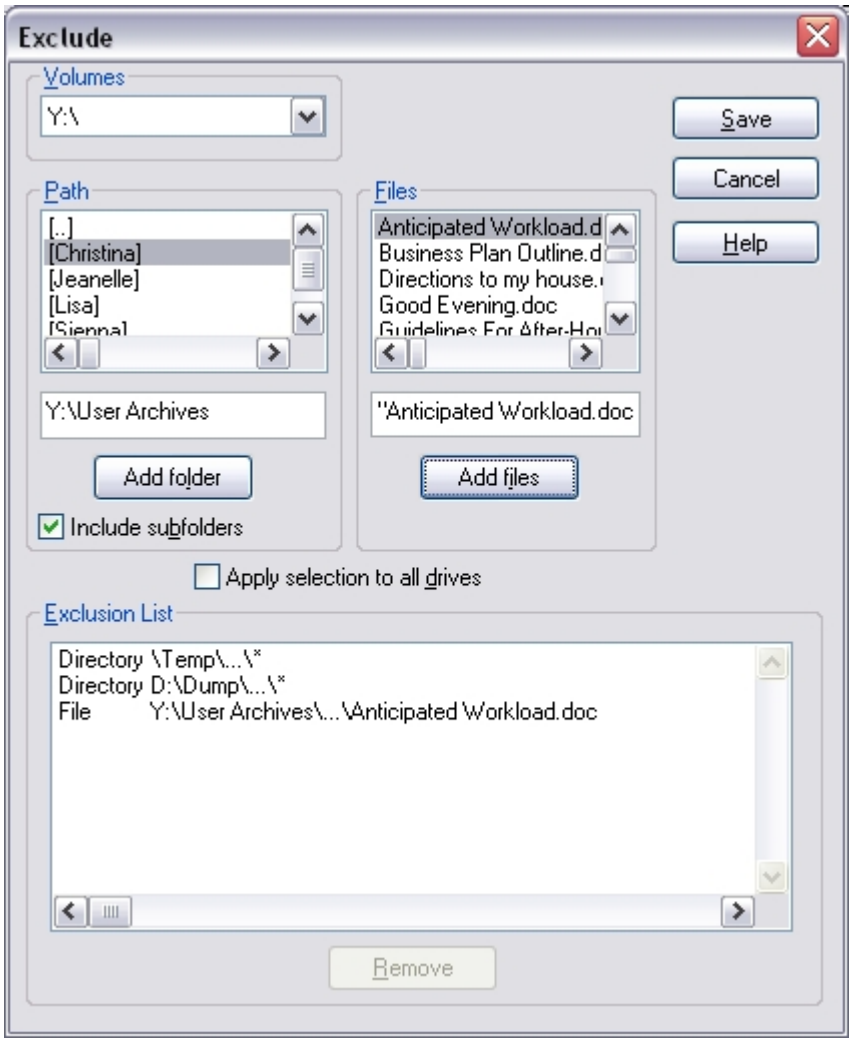
Click Help in the Diskeeper toolbar or the Help option in the Action menu to access the Diskeeper Help system.

Setting an Exclusion List

Diskeeper exclusion lists allow you to specify files and directories that will not be allowed to be processed by Diskeeper in the Set It and Forget It or manual defragmentation modes. For example, you might not want to defragment temporary files that will soon be deleted.

Keep in mind that fragmented files that are excluded from defragmentation can “skew” the analysis results displayed in the Performance and Reliability panes.

Choose the **Exclude selected files and folders** option from the **Change your settings** menu in the Command pane to open the **Exclude** dialog box shown below: (This option is also available from the Action menu.)



Note: Wildcard file specifications such as ***** or **?** are allowed.

The following controls are available in the **Exclude** dialog box:

Files

Use this section of the **Exclude** dialog box to choose specific files (by name) to be excluded from defragmentation. Highlight the file(s) to be excluded, and then click **Add Files** to add the file to the exclusion list.

Path

Use this section of the **Exclude** dialog box to choose specific directories to be excluded from defragmentation.

Select a directory by highlighting it, and then click **Add Folder** to add the directory to the exclusion list.

When a directory folder is added to the exclusion list, any subdirectories below the directory in the tree are also excluded.

Volumes

Use this section of the **Exclude** dialog box to choose the disk volume from which you want to exclude files or directories from defragmentation.

Add Files Button

Click **Add Files** to add the selected file(s) to the Diskeeper exclusion list.

Add Folder Button

Click **Add Folder** to add the selected directory path to the Diskeeper exclusion list.

Exclusion List Box

This box shows the files, directories, and volumes that will be excluded from defragmentation.

Remove Button

Click **Remove** to remove specific files, directories, or volumes from the Diskeeper exclusion list. To remove one or more items from the list, highlight the items in the Exclusion List Box and click Remove.

Save Button

Click **Save** to save the exclusion list and return to Diskeeper.

Cancel Button

Click **Cancel** to cancel any changes you have made to the Diskeeper exclusion list and return to the main Diskeeper display.

Help Button

Click **Help** for context-sensitive help about the Diskeeper file exclusion list option.

Diskeeper Internal Exclusion List

There are certain files that should not be moved under any circumstances. These files may be system files or files related to specific applications. Moving these specific files can cause system or application failure. As a result, Diskeeper uses an “internal” exclusion list to ensure these files are always excluded from Diskeeper processing. This list is fixed in memory and cannot be modified. These are the files that are currently in the Diskeeper internal exclusion list:

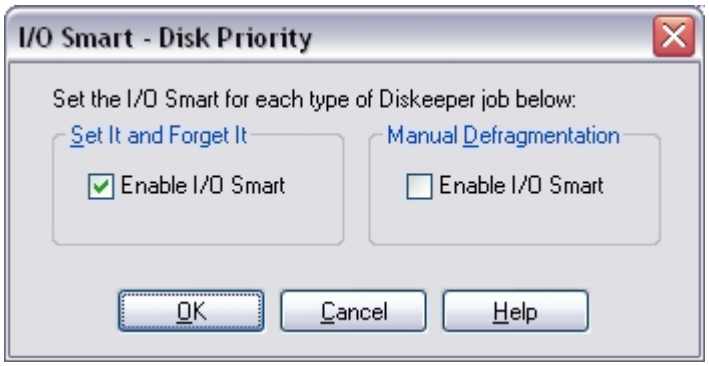
- bootsect.dos
- hiberfil.sys
- memory.dmp
- safeboot.fs
- safeboot.csv
- safeboot.rsv

Note that these files are not displayed in the Diskeeper user-defined exclusion list. See page 55 for more information about the Diskeeper internal exclusion list.

I/O Smart – Disk Priority

Select the **Set defragmentation priority** option from the **Change your settings** menu in the Command pane to select the I/O Smart settings for Diskeeper defragmentation jobs. (This option is also available from the Action menu.) You can enable the I/O Smart option independently for both “Set It and Forget It” and “Manual Defragmentation” defragmentation jobs.

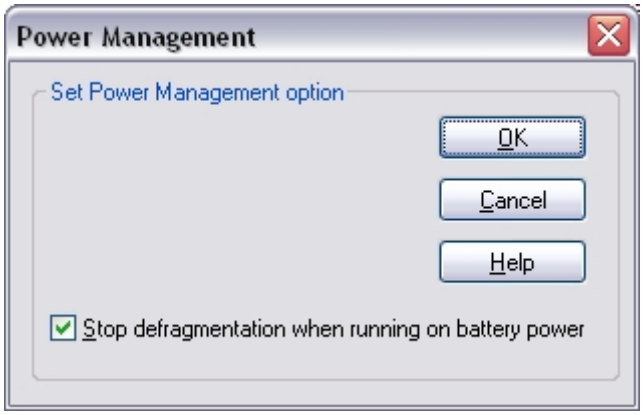
The I/O Smart option “throttles” (suspends) the defragmentation process whenever disk I/O activity is detected on a disk while it is being defragmented. This ensures the defragmentation process will be transparent to you, no matter how active the disk.



To change the I/O Smart setting for either Set It and Forget It or manual defragmentation, select the appropriate option and then click **OK**.

Using Power Management

The Power Management option is intended for users of laptop or portable computers. Use the **Set power management options** option in the **Change your settings** menu to enable or disable this feature. (This option is also available from the Action menu.)



When this option is enabled and the computer is running on battery power, any scheduled defragmentation jobs are postponed, and a message noting this is written to the Windows Application Event Log. If you manually start a defragmentation job when this option is enabled (and the computer is running on battery power), a message is displayed asking if you want to continue, even though running Diskeeper on battery power may reduce the available battery time.

When this option is enabled and the computer switches from normal power to battery power, any ongoing scheduled analysis or defragmentation jobs are safely stopped and a message noting this is written to the Windows Application Event Log. If you are running Diskeeper manually and the computer switches to battery power when this option is enabled, a message is displayed informing you that Diskeeper has stopped running.

Logging Diskeeper Activity

Use the **Set event logging options** option from the **Change your settings** menu in the Command pane to open the **Event** Logging dialog box. (This option is also available from the Action menu.) Use this option to enable and disable the logging of various Diskeeper events to the Windows Application Event Log.

Windows 2000/XP Event Log

When Diskeeper is running on Windows 2000 or Windows XP, a log of Diskeeper activity is stored in the Application Event Log file.

When Diskeeper logs an event, the event and its message are appended to the Windows Application Event Log file, along with the date, time, user, and other identifying information.

These events can then be viewed with the Windows Event Viewer by choosing the **Application** option in the **Log** menu of the Event Viewer. This can be done on either local computers or remote computers on your network. The Event Viewer is found in the Computer Management Console on Windows 2000 and Windows XP.

By default, the Application Event Log is 512 kilobytes in size and is set to overwrite events older than 7 days. Diskeeper may quickly fill the log file if these default settings are used. To make this log a more useful size, perform the steps described in “The Windows Application Event Log,” page 4.

Windows 95/98/Me Event Log

When Diskeeper is running on Windows 95/98/Me systems, it provides the option of logging Diskeeper events into a text file. When Diskeeper logs an event, the event and its message are appended to the Diskeeper log file. These events are written as a text file, which can then be viewed with Notepad, or your choice of text editor programs.

The Diskeeper log file is named **DkEventLog.txt** and it is stored by default in the directory folder where Diskeeper is installed. The file is limited to 1 MB in size. When it reaches this size, the log is purged completely and the event log is started from scratch.

Specifying What Gets Logged

Use the **Set event logging options** option from the **Change your settings** menu in the Command pane to open the **Event Logging** dialog box. (This option is also available from the Action menu.)

The **Event Logging** dialog box displays a list of events for which logging can be enabled or disabled. Click the check boxes for the following options to alternately enable or disable each option.

Service start and stop

When this option is enabled, an entry is made to the Event Log each time the Diskeeper service starts or stops. This option is enabled by default.

Defragmentation start and stop

When this option is enabled, an entry is made to the Event Log whenever a defragmentation run starts or stops. The Event Log entry for this option also includes information about files that cannot be moved, either because the files are on a Diskeeper exclusion list, or the files cannot be opened. Common causes preventing a file from being opened include access controls or permissions on the file being set to prevent Diskeeper from accessing it. File permissions must allow SYSTEM to have full control of a file in order for Diskeeper to defragment it. See page 57 for more information about setting access permissions.

This option is enabled by default.

Defragmented files

When this option is enabled, an entry is made to the Event Log listing each file that is defragmented by Diskeeper. Note that enabling this option can cause the Event Log to fill rather quickly, especially if Diskeeper defragments a high number of fragmented files. (This will be particularly likely when Diskeeper is first run on a volume, since Diskeeper will probably be defragmenting a large number of files.)

This option is not enabled by default.

Moved files

When this option is enabled, an entry is made to the Event Log each time a file is moved for reasons other than to defragment the file. This would include cases where files are moved in order to create more contiguous free space. This option also notes when files could not be moved, such as files that are on a Diskeeper exclusion list or files that cannot be opened. Common causes preventing a file from being opened include access controls or permissions on the file being set to prevent Diskeeper from accessing it. As mentioned previously, file permissions must allow SYSTEM to have full control of a file in order for Diskeeper to defragment it. See page 57 for more information about setting access permissions.

Here again, enabling this option can cause the Event Log to fill quickly. This option is not enabled by default.

Disk information

On Windows 2000 and Windows XP: When this option is enabled, an entry is made to the Application Event Log at the end of each defragmentation run showing general information about the disk volume that was defragmented. This appears in the Windows Event Viewer as Diskeeper Event 15. This option is not enabled by default.

On Windows 95/98/Me: When this option is enabled, an entry is made in the Diskeeper EventLog.txt file containing information as described above. This option is not enabled by default.

For a description of information contained in the Description box, see page 23.

File information

On Windows 2000 and Windows XP: When this option is enabled, an entry is made to the Event Log at the end of each defragmentation run showing information about the files on the disk volume that was defragmented. This appears in the Windows Event Viewer as Diskeeper Event 16. This option is not enabled by default.

On Windows 95/98/Me: When this option is enabled, an entry is made in the Diskeeper EventLog.txt file containing information described above. This option is not enabled by default.

For a description of information contained in the Description box, see page 23.

Paging File information

On Windows 2000 and Windows XP: When this option is enabled, an entry is made to the Event Log at the end of each defragmentation run showing information about the paging file on the volume that was defragmented (if it exists on the volume). This appears in the Windows Event Viewer as Diskeeper Event 17. This option is not enabled by default.

On Windows 95/98/Me: When this option is enabled, an entry is made in the Diskeeper EventLog.txt file containing information as described above. This option is not enabled by default.

For a description of information contained in the Description box, see page 23.

Directory information

On Windows 2000 and Windows XP: When this option is enabled, an entry is made to the Event Log at the end of each defragmentation run showing information about the directories on the volume that was defragmented. This appears in the Windows Event Viewer as Diskeeper Event 18. This option is not enabled by default.

On Windows 95/98/Me: When this option is enabled, an entry is made in the Diskeeper EventLog.txt file containing information as described above. This option is not enabled by default.

For a description of information contained in the Description box, see page 23.

MFT information

On Windows 2000 and Windows XP: When this option is enabled, an entry is made to the Event Log at the end of each defragmentation run showing information about the Master File Table (MFT) on the volume that was defragmented. (Keep in mind, since only NTFS volumes have an MFT, this information will only apply to NTFS volumes.) The entry appears in the Windows Event Viewer as Diskeeper Event 19. This option is not enabled by default.

This option does not exist on Windows 95/98/Me machines, as MFT files are unique to Windows NT through Windows Server 2003.

For a description of information contained in the Description box, see page 23.

Chapter 5

Theory of Operation

This chapter describes the Diskeeper design goals and how those goals were met.

Introduction

As described in the introduction of this manual, the term *disk fragmentation* means two things:

- a condition in which pieces of individual files on a disk are not contiguous, but rather are broken up and scattered around the disk volume; and
- a condition in which the free space on a disk volume consists of little pieces of space here and there rather than a few large free spaces.

The effects of excessive fragmentation are twofold as well:

- file access takes longer because a file must be collected in pieces here and there, requiring several disk accesses instead of just one; and
- file creation takes longer because space for the file must be allocated in little pieces here and there instead of just one contiguous allocation.

Before the introduction of Diskeeper, there was no method for completely correcting the problems of file and free space fragmentation on Windows NT computers or in a mixed Windows network.

Design Goals

In designing Diskeeper for Windows, the following goals were established:

- The product must be completely safe to use.
- It must improve Windows system performance. It is not designed to make the disk look “pretty”—it is designed to improve disk performance and, as a result, overall system performance.
- It should process live disks without interfering with user access to files.
- It should run without operator intervention.
- It must defragment all possible files and consolidate free space into the smallest possible number of large spaces.

Diskeeper defragments files and free space on a disk, allowing access to the files on the disk at any time while Diskeeper is running.

Safety

Diskeeper is designed with *safety* as the highest priority.

To ensure the safe movement of files on Windows NT, Windows 2000, Windows XP, and Windows Server 2003 systems, Diskeeper uses mechanisms built into the operating system that were developed and implemented by Executive Software, and fully incorporated into Windows NT, Windows 2000, Windows XP, and Windows Server 2003 by Microsoft. On Windows 95, Windows 98, and Windows Me systems, Diskeeper uses similar mechanisms used by Microsoft and others.

By using these built-in mechanisms, Diskeeper maintains cache coherency, file security and permissions information, and file content integrity no matter how fragmented the files on the disk are.

The foremost design goal for Diskeeper is to make sure that no data is ever lost. To accomplish this goal Diskeeper uses the following criteria for accessing files:

- the contents of data files are never modified under any circumstances
- only one file is processed at a time, not the whole disk
- each processing pass is independent of the other passes
- no information is stored on any other device or in a “scratch space”
- Diskeeper accesses a file in such a way that no user access can conflict with Diskeeper during the critical portion of the relocation process
- file relocation is aborted if any error is encountered, leaving the file in its original state

Diskeeper was designed to err on the side of caution. In other words, it only moves a file on the volume when it is absolutely certain that no data will be lost, including file attributes. The only change to file attribute-type information is the physical location of the file on the volume. None of the file dates are changed and no other fields in the file record header are used to store Diskeeper information.

Diskeeper never defragments or moves files that are specifically stored at a specific physical location on the volume.

If anything causes your computer to crash while Diskeeper is running, or if you abort the Diskeeper defragmentation run in the middle of the file relocation process, no data is ever at risk.

Windows 95/98/Me Note: Stopping or pausing a Diskeeper job through its menus or toolbars is completely safe. Note, however, that in the event of a system crash or other non-standard termination of the Diskeeper process while it is running, it is possible for free space and file information to be stored incorrectly. Executive Software strongly recommends running the Windows Scandisk error checking utility immediately when Diskeeper is stopped abnormally. Scandisk will correct any potential file errors.

Performance

When running in the “Set It and Forget It” mode, Diskeeper is designed to run in the background, without adversely affecting performance of your Windows computer. Steps have been taken to assure that, by default, Diskeeper overhead has the lowest possible impact on system performance. Diskeeper can be run at the lowest possible Windows priority, using only otherwise unused CPU cycles. Diskeeper was designed in such a way to ensure it will not interfere with other processes on your Windows computer.

Process Live Disks

It is not acceptable to force users off the disk while performing routine defragmentation. To do so would be a case of the cure being worse than the disease. Access to fragmented files is better than no access at all.

The best solution is to defragment online with users active on the same disk volume. Diskeeper was designed with this in mind. During most of the time Diskeeper is processing a file, it shares the file with any other users that may access the same file. The last step of processing the file, however, involves locking the file for a very brief period, a matter of milliseconds. If another user requests a file that Diskeeper has locked, that request is suspended for the brief period until Diskeeper releases the file. Then the request is serviced. There is never an interruption of either process as a result of this delay.

This solution allows Diskeeper to defragment open files safely, regardless of whether they are open for read operations or for write operations.

Note: Due to the Windows NT 4.0 design, directories, MFT and paging files cannot be moved safely on live disks. (NTFS directories *can* be moved on Windows 2000, Windows XP and Windows Server 2003.) Therefore, Diskeeper performs these operations at the only safe time, while the computer is starting up.

No Operator Intervention

In keeping with the design goals, after Diskeeper has been started in the “Set It and Forget It” mode, it runs automatically in the background, without the need for operator intervention. It runs indefinitely, unless told otherwise by you.

Appendix A

Table of Diskeeper Editions

The table below shows the different editions of Diskeeper available, as well as the features and capabilities of each:

	Diskeeper 9.0 Editions				
	Home	Professional	Server Standard	Server Enterprise	Administrator
Defragmentation	✔	✔	✔	✔	N/A
Performance Analysis	✔	✔	✔	✔	N/A
Reliability Analysis	✔	✔	✔	✔	N/A
Fragmentation Analysis	✔	✔	✔	✔	N/A
Set It and Forget It Scheduling	✔	✔	✔	✔	N/A
Boot-Time defragmentation		✔	✔	✔	N/A
Defragmention methods	1	4	4	4	N/A
Exclusion list	✔	✔	✔	✔	N/A
Event logging	✔	✔	✔	✔	N/A
Adjustable Priority		✔	✔	✔	N/A
I/O Smart	✔	✔	✔	✔	N/A
Frag Shield		✔	✔	✔	N/A
Command line interface		✔	✔	✔	N/A
Maximum single volume size supported	512 GB	512 GB	768 GB	4 TB	N/A
Total disk space supported (all volumes)	No limit	No limit	No limit	No limit	N/A
Simultaneous operations	1	4	8	16	N/A
Terabyte Volume Engine				✔	N/A
64-bit processor Compatible			✔	✔	
Remote control of local Diskeeper editions					✔
Can be controlled by Diskeeper Administrator		✔	✔	✔	N/A

54 Diskeeper Editions

This table shows the different Diskeeper editions available and the Windows operating systems they support:

	Diskeeper 9.0 Editions				
	Home	Professional	Server Standard	Server Enterprise	Administrator
Windows 95	✔	✔			
Windows 98	✔	✔			
Windows Me	✔	✔			
Windows XP Home	✔	✔	✔		
Windows XP Tablet PC	✔	✔	✔		✔
Windows XP Media Center	✔	✔	✔	✔	✔
Windows NT 4.0 Workstation		✔	✔		✔
Windows 2000 Professional	✔	✔	✔	✔	✔
Windows XP Professional	✔	✔	✔	✔	✔
Windows NT 4.0 Server			✔		✔
Windows 2000 Server			✔	✔	✔
Windows Server 2003 Web			✔	✔	✔
Windows Server 2003 Standard			✔	✔	✔
Windows 2000 Advanced Server			✔	✔	✔
Windows NT 4.0 Enterprise Server			✔		✔
Windows Server 2003 Enterprise				✔	✔
Windows 2000 w/Server Appliance Kit			✔	✔	
Windows Server 2003 w/Server Appliance Kit			✔	✔	

Appendix B

Answers to Frequently Asked Questions

Does Diskeeper work with Windows XP Service Pack 2?

Yes. However, if you are installing or running Diskeeper on a computer running Windows XP Service Pack 2, be sure to visit http://www.executive.com/sp2 for the latest information about running Diskeeper with Service Pack 2.

Why won't my volume defragment completely?

This can be the result of several situations. If your volume is extremely full, there may not be sufficient free space to defragment the files completely. In that case, we recommend temporarily moving some of the files off the volume, particularly large files. This temporary measure often allows Diskeeper the "working room" it needs to complete the defragmentation process. It also allows Diskeeper to defragment the free space on the volume, increasing the possibility that the temporarily-moved files can be moved back to the volume in a contiguous or less fragmented condition.

Another cause of incomplete defragmentation is a fragmented paging file. For more information, see *Can Diskeeper defragment paging files?* on page 56.

A volume that, at some time, has been filled to capacity may have a severely fragmented Master File Table (MFT). Volumes that have been converted from FAT to NTFS often also have a fragmented MFT. A White Paper describing the causes and effects of MFT fragmentation is available from the Executive Software Web site at http://www.execsoft.com/whats-new/whitepaper.asp. Another situation that can prevent complete defragmentation of a volume is the existence of a large number of directories on the volume. For more information, see *Can Diskeeper move directories?* on page 56.

Yet another cause for incomplete defragmentation on Windows NT, Windows 2000, Windows XP, and Windows Server 2003 systems can be a security access situation. Both SYSTEM and ADMINISTRATOR must have full control over a file (or the directory folder it is in) in order for Diskeeper to have access to move the file. This is because the Diskeeper service runs under the Administrator account, and System access is necessary to defragment files safely. This security feature is governed by the Windows NT, Windows 2000, Windows XP, and Windows Server 2003 C2 security requirements. Included with Diskeeper is a batch file that sets the access permissions on a disk volume to allow Diskeeper to run properly. See page 57 for information about using this batch procedure.

Diskeeper won't move some files no matter what I do. Is there a problem with Diskeeper?

Diskeeper has a built-in list of files that it will not move under any circumstances. This list is referred to as the Diskeeper internal exclusion list.

The most common reason for a file existing on the Diskeeper internal exclusion list is safety. The file cannot or should not be moved in order to maintain the integrity of your system.

For example, the file memory.dmp is on the Diskeeper internal exclusion list. This file is on the exclusion list because the disk locations where this file is stored are loaded by the kernel when the system boots and stored in memory. These disk locations are then used to write the dump file should it need writing. If Diskeeper were to move this file, then the system failed, the dump file would be written over other files or in space considered to be free space. This could result in a very corrupted disk.

The same situation applies to hiberfil.sys. When your system goes into hibernation mode, the pre-fetched disk locations are overwritten with the hibernation data. If Diskeeper moved hiberfil.sys out and moved other files into those disk locations, then disk corruption would occur.

Why doesn't Diskeeper move all of the files into one place on the volume?

Our primary philosophy with Diskeeper is improving and maintaining the performance of your computer. The disk drives are the primary bottleneck in your computer's performance. Diskeeper restores the disks to top speed by eliminating fragmentation.

It is a common misconception that a defragmented disk should look very neat and tidy in the Drive Map pane, with solid blue bars all the way across the screen (representing fragmentation-free files) and the rest white space (representing consolidated space).

Clearly, the speed of the disk (meaning how fast you can access the data on it) is more important than the prettiness of the display or the consolidation of all the free space into one place. Free space consolidation might be important if the next file that you plan to create needs to be one gigantic contiguous file, but it has no effect on performance. Because of this, Diskeeper uses algorithms that achieve the highest speed from your drive regardless of the arrangement of the free spaces on the drive and on the screen—and it does so without wasting time on excessive consolidation of free space. We simply go for the fastest possible file access times and then stop.

Even so, you might ask why we don't continue and rearrange the files further to get a neat display? Because it takes computer power to do so. We long ago decided that it would be wrong for Diskeeper to consume more of your computer's performance than it gives back. So Diskeeper defragments until the disk is in top shape performance-wise and then stops. Any further work is a waste of your computer resources.

Now this might not be important to you if you like to sit and watch the display as Diskeeper defragments your drive, but it is a very big deal to large corporate data centers and people who depend on their computers for their work. They need all the performance they can get and can't hold up production while the defragmenter works to enhance the “look” of the disk but not improve its performance. This is why Diskeeper is designed to run in the background at the lowest possible priority, giving way to any other program that needs to run. And it is also why Diskeeper stops defragmenting when maximum performance has been achieved.

Can Diskeeper move directories?

On Windows 95/98/Me computers, and NTFS volumes on Windows 2000 and Windows XP systems, Diskeeper Home Edition can safely move and defragment directories.

Can Diskeeper defragment paging files?

Diskeeper Home Edition does not defragment active paging files, since paging files must be open for exclusive use by Windows at all times.

Can Diskeeper defragment the Master File Table?

The Master File Table (MFT) is the area on an NTFS disk volume where Windows 2000 and Windows XP keep the necessary information for retrieving files from the disk volume. The MFT also contains information such as file creation, modification, and backup dates and times. Diskeeper Home Edition can safely defragment this critical system file while Windows is running.

Why doesn’t Diskeeper completely consolidate the free space on my volume?

Several factors can prevent the free space on a volume from being defragmented.

On NTFS volumes, a portion of the free space on the volume is reserved by Windows for the Master File Table (MFT). For more information, see *Can Diskeeper defragment the MFT?* above.

Having all of the free space in a single, contiguous piece provides very little (if any) performance benefit. Free space fragmented into hundreds of pieces will affect your disk performance, but free space that’s in a few pieces should not have any effect on the performance of your volume.

Why don’t my files get moved to the beginning of the volume?

On NTFS volumes, Windows 2000 and Windows XP reserve a portion of the free space on a disk volume for the Master File Table (MFT). This free space is usually most noticeable at the physical “beginning” of the volume (easily seen using Drive Map pane), but space is also reserved for use by the MFT in other areas of the volume.

Since this space is reserved for exclusive use, Diskeeper will not move files into these areas of the volume, but will move them out of these areas.

Why don't all of my NTFS volumes appear in the Diskeeper Volume List?

Both SYSTEM and ADMINISTRATOR must have full control over a file (or the directory folder it is in) in order for Diskeeper to have access to move the file. This is because the Diskeeper service runs under the Administrator account, and System access is necessary to defragment files safely. This is a security feature governed by the Windows 2000 and Windows XP C2 security requirements.

If the root-level directory folder does not have SYSTEM and ADMINISTRATOR set for full control (as seen in the Permissions section under the Security tab in the Properties dialog box) Diskeeper will not display the disk volume in the Volume list under some circumstances.

How do I determine how often to run Diskeeper on my volume?

This depends on many factors, including the level of file activity, the sizes and types of files used, and the amount of free space available on the volume. While there are no set rules on how often to defragment your disk volumes, here are some guidelines.

- Of course, the first suggestion is to let the Diskeeper Smart Scheduling feature automatically and dynamically determine the optimum run frequency for your particular disk volumes. Smart Scheduling monitors the fragmentation levels of your volumes and adjusts the defragmentation schedule to best fit your needs, even as those needs change. See *Smart Scheduling* on page 32.
- To determine how often to run Diskeeper on your disk volumes, you can use the logging function of Diskeeper to monitor the number of files moved during each Diskeeper run. For information about how files that are moved by Diskeeper are logged, see “Logging Diskeeper Activity” on page 44. In general, if Diskeeper moves fewer than 50 files per run, you are running Diskeeper frequently enough to maintain the performance of your Windows system at an optimum level. If the number of files moved during each run is greater, or is increasing, schedule Diskeeper to run more frequently. (Here again, you can automate this by letting the Diskeeper Smart Scheduling feature control when to run Diskeeper.)

How do I set access permissions to allow Diskeeper to defragment my files?

In order for Diskeeper to have access to move files on NTFS volumes, both SYSTEM and ADMINISTRATOR must have full control over a file (or the directory folder it is in). This version of Diskeeper includes a batch file that sets the access permissions on a disk volume to allow Diskeeper to run properly. This batch file is called **setdkacls.bat**, and it is located in the directory folder where Diskeeper is installed.

If you find you have made files inaccessible to Diskeeper, or that you have some files inaccessible to Diskeeper, open a command-prompt window, change directory to the Diskeeper installation directory, and type:

```
setdkacls x:
```

where *x:* is the letter name of the disk volume on which you want to change access permissions.

The **setdkacls.bat** procedure automates the following sequence of commands:

```
cd /d x:

cd \

cacls *  /e /t /c /g Administrators:F System:F
```

For more information about the **cacls** command, type **cacls /?** at a command prompt.

This batch procedure will only work if the account you are logged onto has been granted access to the file(s) you are wanting to defragment.

Why doesn't the free space reported by the post-analysis (or post-defragmentation) summary pop-up screen match what the Diskeeper Fragmentation pane shows?

Several post-analysis and post-defragmentation summary screens include information about the amount of free space available on the volume for defragmentation. This figure is based on the space available to Diskeeper, which may be less than the total free space on an NTFS volume. NTFS volumes reserve a percentage of the total volume for the Master File Table (MFT), which Diskeeper cannot use for defragmenting files. Because of this, the figure shown in the Diskeeper post-analysis and post-defragmentation summaries on NTFS volumes will not match the total free space figure displayed in the Diskeeper Fragmentation pane (or other utilities like Disk Properties in Windows Explorer).

Why do I get an incorrect excess fragment count after defragmenting an NTFS drive under Windows 2000?

Under Windows 2000, NTFS files that have been compressed, then decompressed, accumulate excess space allocations that Diskeeper cannot move. (The defragmentation APIs can only move actual data, not unused allocated space in the file.)

Microsoft states in knowledge base article Q228198 "Disk Defragmenter Analysis Shows More File Fragments Than File Size Suggests" that the "excess allocation" is released when the file is closed. Experiments performed in our labs show that this is not the case. The disk must be dismounted and remounted (or the system rebooted) followed by an open and a close of the file for the excess allocation to be released.

Therefore, when this condition exists on an NTFS volume, Diskeeper moves the data portion of a file, and if the file has an excess allocation, it can actually fragment the file—one piece being the data just moved, the other piece being the excess allocation "left behind". Diskeeper notes this properly in its statistics. However, sometime after the file movement is completed and the file is closed, the excess allocation is released by Windows 2000. Thus, a subsequent analysis shows the fragmentation figures reported at the end of the defragmentation run to be wildly wrong.

This excess allocation phenomena was introduced in Windows 2000, but is not present in Windows XP or Windows Server 2003.

Diskeeper engineers are working on a solution for this inconsistency. Until it is found, you can (1) avoid using NTFS disk compression or (2) perform a subsequent disk analysis to get the correct information.

How can I run Diskeeper from an account that is not a member of the Administrators group?

On Windows 2000 and Windows XP, if the account you are using is not a member of the Administrators group, you will not be able to install or operate Diskeeper. We recommend that you simply use the Set and Forget It feature to set a schedule to allow Diskeeper to run in the background on all systems. Since the Set It and Forget It operation runs under the SYSTEM process, there is no need for an administrator to be logged in when it is running.

Do I need to have the Diskeeper service running all the time?

Yes. **DkService** is the program that actually runs Diskeeper defragmentation jobs. It monitors the Diskeeper schedule file and starts defragmentation jobs when they are needed. If the Diskeeper service is disabled or not present, you will not be able to run Diskeeper at all.

That said, if you look at the DkService process using Task Manager, you will see that it uses only a few seconds of CPU time each week. The fact that it is running all the time is not going to use up system resources, or cause any problems.

Since installing Diskeeper, the number of disk errors I get has increased. Why is that?

Diskeeper tends to increase disk activity, and just by running, it can make weak points in the system break. In this case, you have some disk error, most likely in the free space where the Windows disk error checking utility (CHKDSK) cannot find it.

Run CHKDSK/R on your operating system volume at least, preferably on all volumes. That should correct any errors. (CHKDSK/F may not correct this issue.)

If CHKDSK itself aborts when it reaches the bad block, it indicates a disk problem which CHKDSK can't handle, and which will likely cause more trouble in the future. You should back up the volume and reformat (or replace) it to prevent the possibility of data loss due to drive failure.

If you are running Windows 95/98/ME, run Scandisk Thorough instead of CHKDSK.

How can I find which version of Diskeeper I have installed?

Open Diskeeper, click the **Action** menu, then select **About**. This tells you which Diskeeper edition, version and build is installed.

Appendix C

Support Services

U.S. Support Services

Registered users are entitled to 90 days of free telephone support, as well as special upgrade pricing, from Executive Software. Our free U.S. technical support is available Monday through Friday during the first 90 days from 7:00 A.M. to 5:30 P.M. Pacific time. If you have not yet registered your Diskeeper for Windows purchase, use the registration card in your Diskeeper box and do so now. Or, register your purchase online via our Web site at:

www.executive.com

Most technical support questions can be answered from the Technical Support section of our Web site at the address shown above.

You can also contact our technical support team via the Internet at:

tech_support@executive.com

Or via FAX at:

818-252-5514

If you are within your 90-day free support period, or have purchased telephone support, you can call:

818-771-1600

When your 90-day free support period has expired, you can purchase the support plan which best suits your needs. Executive Software offers 24-hour, 7-day support plans. Contact Executive Software to find out which support options suit you best.

Executive Software's address is:

Executive Software

7590 North Glenoaks Boulevard

Burbank, California 91504, USA

European Support Services

Registered users are entitled to 90 days of free telephone support, as well as special upgrade pricing, from Executive Software. Our free European technical support is available Monday through Friday during the first 90 days from 8:30 to 17:30 GMT. If you have not yet registered your Diskeeper for Windows purchase, use the registration card in your Diskeeper box and do so now. Or, register your purchase online via our Web site at:

www.executive-europe.com

Most technical support questions can be answered from the Technical Support section of our Web site at the address shown above.

You can also contact our technical support team via the Internet at:

tech.support@execsoft.co.uk

Or via FAX at:

+44 (0) 1342-327390

If you are within your 90-day free support period, or have purchased telephone support, you can call:

+44 (0) 1342-327477

When your 90-day free support period has expired, you can purchase the support plan which best suits your needs. Executive Software offers 24-hour, 7-day support plans. Contact Executive Software to find out which support options suit you best.

Executive Software's address is:

Executive Software UK Inc.

Kings House, Cantelupe Road

East Grinstead, West Sussex RH19 3BE

England

Glossary

access: To store *data* on, or retrieve data from, a *disk drive* or other *peripheral device*. See also *file*.

administrator: See *system administrator*.

applet: A small *application* program that is usually built into an *operating system* or a larger application program. For example, the built-in writing and drawing programs that come with *Windows* are sometimes called “applets.”

application: A computer *program*, which causes a computer *system* to perform some useful work for the user.

AutoPlay: A feature of some *Windows* applications on *CD-ROM* that causes the program to start automatically when the CD-ROM is placed in the drive.

background processing: The execution of certain operations during momentary lulls in the primary (foreground) process. An example of a background process is printing while a word processor is waiting for keystrokes.

binary: From Latin “bini,” meaning two by two and “ary,” meaning of, or pertaining to. Computers use the binary number system, which is a way of counting in which only two *digits* (0 and 1) are used. Contrast with the familiar decimal number system, in which we count with 10 digits (0 through 9).

bit: Short for *binary digit*. The smallest unit of information handled by a computer. Like a light switch, a bit is either on or off, which corresponds to a numerical value of one or zero. Larger numbers are expressed by groups of bits. See also *byte*.

boot: Refers to the initial start-up of a computer, such as when you turn on the computer’s power. From the word “bootstrap,” indicating the computer “lifts itself by the bootstraps;” that is, it gets itself going.

boot-time: The time during which a computer *boots*; that is, the computer is starting up and the *operating system* has not yet taken over control of the computer.

browser: A software program, such as Microsoft’s *Internet Explorer*, designed to locate and view Web pages on the *Internet*. In addition to displaying text, modern browsers also can display pictures and play sounds.

byte: A group of eight *bits*, which can represent a number from zero through 255, a letter of the alphabet, or a variety of other things.

cache: From the French word *cacher*, meaning “to hide.” A temporary storage facility designed to speed things up by providing information to software that would otherwise have to be obtained from a slower *medium*. Caches exist for Web browsers, *disk drives* and *CPU*s. See also *cache memory*.

cache coherency: A condition where the *data* contained in the *cache memories* in a computer with multiple processors is kept consistent at all times.

cache memory: In computers, a cache is a small amount of very fast *memory* that is placed close to (or inside) the *CPU chip*, in order to improve performance. The cache memory holds copies of recently accessed *data*. Because computer programs often run the same instructions repeatedly, many times the CPU will find the data it needs in the cache and therefore will run faster because it does not need to access the computer’s main memory.

CD-ROM: Compact Disk Read-Only Memory. A stiff plastic disk commonly used by *software* manufacturers to distribute software to customers. As the name implies, the original contents of a CD-ROM cannot be changed.

central processing unit (CPU): The part of the computer hardware that controls the computer’s overall operation and performs computations. Most modern CPUs are built into a single *integrated circuit* or *chip*. See also *Pentium*, *x86*.

chip: See *integrated circuit*.

CHKDSK: A program (supplied with Windows NT, Windows 2000, Windows XP, and Windows Server 2003) that checks the integrity of a disk and corrects disk errors such as lost *clusters*. See also *scandisk*.

client: In a computer *network*, a computer that uses the services of another computer, called a *server*. For example, a client can "ask" a server to provide it with needed data, or to print a file for the client. See also *server*, *workstation*.

cluster: Smallest addressable unit of space on a disk. A one-byte file will actually use a cluster of disk space. The minimum size of a cluster depends on the size of the disk *volume*. The *FAT file system* allows a maximum of 65,536 clusters per volume, which means that the cluster size on a 64-megabyte disk volume is one kilobyte, while a 128-megabyte volume uses two-kilobyte clusters. Thus, the FAT file system can be very wasteful of disk space on large volumes. The *NTFS* file system does not suffer from this limitation.

COM: Acronym for Component Object Model, a specification developed by Microsoft for building software *components* that can be made into programs or add functionality to existing programs running on Microsoft Windows platforms.

component: A small modular *program* that performs a specific function and is designed to work interactively with other components and *applications*. See also *applet*, *COM***.**

contiguous: Adjacent; placed one after the other. A contiguous file is not fragmented; that is, it takes up a single "chunk" of disk space. See also *fragmentation*, *defragmentation*.

control file: A file (**Diskeep.ctl**) used by *Diskeeper* to keep track of and control scheduled defragmentation of disk volumes. See also *Set It and Forget It*.

controller: A specialized electronic circuit, which serves as an *interface* between a *device*, such as a *disk drive*, and a computer. See also *IDE*, *SCSI*.

CPU: see *central processing unit*.

data: Information, as processed by a computer. Plural of the Latin word *datum*, meaning an item of information.

database: A collection of related information about a subject, organized in a useful manner that provides a base or foundation for procedures such as retrieving information, drawing conclusions, and making decisions.

datum: Singular of *data*.

defragmentation: The reduction or elimination of *fragmentation*, by making files and/or free disk space more *contiguous*.

device: A machine, such as a printer or a *disk drive*.

digit: From Latin "digitus," meaning finger. Any of the numbers 0 through 9 in the decimal number system, called a digit because people originally used their fingers for counting. Computers use a *binary* number system with only two digits (0 and 1).

directory: A file that contains a catalog of files and other directories stored on a disk, which allows you to organize your files into groups, making them easier to find.

directory consolidation: A *Diskeeper* feature which, at *boot-time*, gathers (almost) all *directory* entries on a disk *volume* into a single area on the disk, instead of scattered in many places. Directory consolidation makes *defragmentation* more effective than it would otherwise be. Directory consolidation requires sufficient contiguous free disk space into which the directories can be moved.

disk drive: A *device* containing one or more disks, treated as a unit by a computer.

Diskeeper: A *software* product that increases *system* performance through disk *defragmentation*. It eliminates *resource*-wasting *file fragmentation* safely, by consolidating fragmented files and free space.

diskette: See *floppy disk*.

domain: In *Windows NT, Windows 2000, Windows XP and Windows Server 2003*, a group of *workstations* and *servers*, defined by an *administrator*, that share a common directory database and allow a user to log onto any *resource* in the domain with a single user ID and password. Each domain in a network has a unique name.

drive: See *disk drive.*

drive letter: In *Windows* and *MS-DOS operating systems*, the naming convention for *disk drives*, consisting of a letter, followed by a colon. Drives A: and B: are normally reserved for *floppy disk* drives and C: typically indicates the first *hard drive*. See also *volume*.

encrypted file: A file that has been scrambled and made unrecognizable by anyone who does not have the proper "key" to decode it. The Windows 2000, Windows XP and Windows Server 2003 Encrypting File System (EFS) allows users to encrypt files and folders on an NTFS volume to prevent access by unauthorized individuals.

event logging: The process of recording audit information when certain events occur, such as *services* starting and stopping, users logging on and off and accessing *resources*. When running Diskeeper on Windows NT, Windows 2000, Windows XP, and Windows Server 2003 systems, logged events can be viewed with the *Event Viewer* utility (in Administrative Tools.) When run on Windows 95/98/Me systems, Diskeeper logs events to a text file that can be viewed with a variety of text editor programs such as Notepad.

Event Viewer: A utility available on Windows NT, Windows 2000, Windows XP, and Windows Server 2003, which permits the viewing of logged events. See also *event logging*.

extended partition: A type of *partition* that permits the limitation of four partitions per disk drive to be overcome. A disk drive may be partitioned into a maximum of four *primary partitions*, or three primary partitions plus an extended partition. One or more *logical drives* may be created within an extended partition.

FAT: See *file allocation table.*

FAT file system: The *file system* used by *MS-DOS* and adapted for *Windows* to store information on disks, which makes use of a *file allocation table*. There are three types of FAT file system. The FAT12 (12-bit) is used on FAT volumes smaller than 16 megabytes in size, such as *floppy disks*—it is not supported by Diskeeper. FAT16 can be found on all versions of Windows from *Windows 95* through *Windows Server 2003*. Windows Server 2003, Windows 2000, Windows Me, Windows 98, and the later OSR 2 version of Windows 95 also support FAT32; Windows NT does not.

field: A subdivision of a *record* in a *file*. For example, a record in a customer file may contain a name field, an address field and a phone number field.

file: A complete, named collection of *data*, such as a *program*, a set of data used by a program, or a user-created document. See also *record, field*.

file allocation table (FAT): A table or list maintained by some *operating systems*, to keep track of how *files* are stored on a disk.

file system: The method used by an *operating system*, of naming, *accessing* and organizing *files* and *directories* on a disk. See also *NTFS, FAT file system.*

floppy disk: A removable storage *medium*, consisting of a small magnetic disk made of flexible plastic, housed in a square protective envelope or cartridge. Originally, floppy disks really were "floppy," because they were enclosed in a paper envelope. Also called a *diskette*, which is a better name for the more recent design that uses a stiff plastic cartridge. Contrast with *hard disk.*

formatting: A method of preparing a disk surface for use by placing certain magnetic patterns on it, which are used by the *file system* in storing and retrieving *data*.

fragmentation: The word *fragmentation* means "the state of being fragmented." The word *fragment* means "a detached, isolated or incomplete part." It is derived from the Latin "fragmentum," which in turn is derived from "frangere," meaning "break." So, *fragmentation* means that something is broken into parts that are detached, isolated or incomplete.

gigabyte: A measure of computer storage capacity equal to approximately a billion bytes. A gigabyte is two to the 30th power, or 1,073,741,824 bytes.

graphical user interface (GUI): Pronounced "gooey." A user *interface*, as used in the *Windows operating systems*, which uses a mouse and graphic displays to interact with the user, with the purpose to make the computer system easier to use than other operating systems, such as *MS-DOS*.

GUI: See *graphical user interface*.

hard disk: One or more rigid metal platters, coated with magnetic material. Contrast with *floppy disk*, or *diskette*, which is made of plastic. Also used to refer to the physical unit that makes up a *disk drive*.

hardware: The physical parts of a computer *system*, including *devices* such as printers and *disk drives*. Contrast with *software*.

IDE: Integrated Device Electronics. One of two common types of *interfaces* between a *disk drive* and a computer, where the *controller* is built into the disk drive, which eliminates the need for a separate controller card in the computer. See also *SCSI*.

integrated circuit: Also called a *chip*. A collection of electronic parts with a specific purpose, built into a single physical package. See also *central processing unit*.

Intel: Manufacturer of *processor chips*, known especially for the *Pentium* and *x86* processors.

interface: The connection and interaction between *hardware*, *software* and/or the user. For example, a disk *controller* provides a physical interface between a computer and a *disk drive*. The keyboard, mouse and display are an interface between a computer and the user.

Internet: A global *network* that links millions of computers. One popular section of the Internet is the World Wide Web, which allows computer users to view text and pictures with the aid of a browser, such as *Internet Explorer*. E-mail (electronic mail) is another popular part of the Internet, which allows computer users to send and receive written messages.

Internet Explorer: A software package developed by Microsoft for browsing the *Internet*, but increasingly used with other applications.

job: A request to have the computer or its *peripherals* perform some activity. In relation to *Diskeeper*, it is a request to have a disk *defragmented*.

log file: A *file* that keeps track of certain events as they occur. The *Windows NT/2000/XP operating system* maintains several log files that can be viewed with the *Event Viewer*. On *Windows 95/98/Me* systems, *Diskeeper* uses a specially created text file for the same purpose. See also *Event Logging.*

logical drive: That portion of the space on a *disk drive* that is considered by the *software* to be a single unit. In this context, *logical* means "conceptual." because there is no direct relationship between the name and a physical object. See also *partition, volume*.

long filenames: In the DOS operating system, filenames were limited to a maximum of eight characters, followed by a period and up to three characters to indicate the type of file. This is also referred to as the 8.3 file naming convention. The Windows 95/98/Me, Windows NT, Windows 2000, Windows XP, and Windows Server 2003 operating systems allow filenames that are over 200 characters long. In addition, these filenames may contain a mixture of upper- and lowercase characters and embedded spaces.

master file table (MFT): On an *NTFS volume*, the master file table is a *file*, which contains information about all other files in that volume. This includes the name of each file, its physical location on the disk, and other information.

media: A collective word for the physical material on which computer-based information is stored, such as a *CD-ROM* or *floppy disk*. Media is the plural of *medium*, but like *data* is often used in the singular form.

medium: See *media*.

memory: The computer's temporary working storage, where *program* instructions and *data* are kept, permitting the *CPU* to process the instructions.

MFT: See *master file table*.

Microsoft: A computer *software* company, with its head office in the state of Washington; creators of the *MS-DOS* and *Windows operating systems*.

MMC: Microsoft Management Console. MMC can be used to create, save and open administrative tools (called *snap-ins*), such as Diskeeper. MMC provides a common user interface for system tools, as well as a system for managing hardware, software and network components.

MS-DOS: Microsoft Disk Operating System. An *operating system* designed for a small computer with a single user running one *application program* at a time.

multitasking: A feature of an *operating system*, where the computer can work on more than one *task* at a time. See also *background processing*.

network: A group of computers that are connected together and capable of exchanging data with each other. See also *server, client*.

NTFS: New Technology File System. A file system designed specifically for use with Windows NT, Windows 2000, Windows XP, and Windows Server 2003.

OEM: Acronym for original equipment manufacturer. The term is misleading, because an OEM typically buys computers from another manufacturer, customizes them for a particular application, and then sells them under the OEM's own brand name.

operating system: A collection of *programs*, which perform *system* functions and control the running of *application* programs and the allocation of *resources*.

OSR 2: Acronym for *OEM* Service Release 2, a version of *Windows 95* released in late 1996, which features an improved file system, called *FAT32*, while the original version of Windows 95 used FAT16.

page file or **paging file:** An area of a disk that is set aside to hold *data* intended to reside in the computer's *memory*. Portions of the paging file are copied to memory as needed. This mechanism requires a much smaller amount of physical memory than would be required if the entire *program* were to be loaded into memory all at once. See also *swap file*.

partition: A subdivision of the space on a *disk drive* that is treated as though it were a separate physical unit. A computer with only one hard disk drive can have a single partition, often called drive C:, or it can have several partitions, such as drive C:, drive D:, and drive E:. See also *volume, drive letter, primary partition, extended partition, logical drive*.

Pentium: The name of a type of *processor*, introduced by *Intel* in 1993. It is the successor to the 80486 and equivalent to the 80586 chip in the *x86* series.

peripheral device: (Related to *periphery*, roughly meaning "on the outside.") A *device*, such as a *disk drive*, printer, keyboard or mouse, connected to and used by a computer.

permission: The ability of a user on a computer *system* to *access* or modify *files*, especially those that he or she did not create. Permissions exist for security reasons, to prevent unauthorized access to sensitive information. The *system administrator* assigns permissions, or "who has access to what."

platform: The environment, in which a computer system operates, either based on the computer's CPU or its operating system. For example: the *x86* platform, or the *Windows Server 2003* platform.

platter: A *disk drive* consists of one or more platters, each of which can receive magnetic recordings on both sides. The platter spins like a phonograph record on a turntable.

primary partition: In *Windows* and *MS-DOS operating systems*, the disk space on a *disk drive* may be divided into a maximum of four primary partitions; or three primary partitions plus an *extended partition*, which in turn can contain one or more *logical drives*.

priority: On a *Windows system*, several *programs* can appear to be running at once, even though the *CPU* can only process one instruction at a time. With the help of the *operating system*, the CPU processes a few instructions from one program, then a few instructions of the next program, and so on, over and over. Without priority assignments, each program would be given about the same amount of time in each "time slot." but by assigning priorities, the more important programs can be given longer time intervals than the less important ones, allowing them to complete faster.

process: A *program*, along with the system *resources* the program requires to run. A process represents a unit of resource ownership and work to be done. The *operating system* creates processes to keep track of resources and to ensure the proper scheduling of *tasks*.

processor: See *central processing unit*.

program: A set of instructions that tell a computer what to do. Synonym: *software*.

RAID: Redundant Array of Independent Disks. A method of combining several *disk drives* to make one large volume. Typically used on a *network file server* to achieve faster *access*, greater protection against disk failure, or both.

record: A collection of related *data* items, treated as a unit. For example, in a *file* containing information about a company's customers, one record would consist of the particulars (name, address, phone number, etc.) of one customer. See also *field*.

registry: A *database* that contains information about current *hardware* settings, installed *software*, user preferences and associations between *file* types, and *applications* that *access* those files.

resource: Any part of a computer system, such as a *disk drive*, printer, or *memory*, which can be used by a *program*.

scandisk: A program (supplied with Windows 95, Windows 98 and Windows Me) that checks the integrity of a disk and corrects disk errors such as lost *clusters*. See also *CHKDSK*.

SCSI: Small Computer System Interface. One of two common methods of *interfacing disk drives* and other *devices* to computers. See also *IDE*.

server: On a computer network, a computer that makes *resources* available to other computers (*clients* or *workstations*.) For example, all the computers on a network can be set up to share a single high-speed printer, which is connected to the server. Usually, the server is faster and more powerful than the client computers connected to it.

service: A process that performs a specific system function and often provides an application programming interface (API) for other processes to call. *Diskeeper* uses a *Windows* service, which allows Diskeeper to run in the *background* while other applications are running.

Service Pack: A collection of *software* used to issue corrections and updates to software between major releases. Usually refers to compilations of corrections and updates to a Windows operating system.

Set It and Forget It: A term that was created by Executive Software, which is a registered trademark and hallmark of the company. A "Set It and Forget It" product can operate transparently (unseen by the user) and in the *background* (concurrent with other *applications*). After a schedule is set up for its operation, it thereafter performs its functions at predetermined times, without further intervention or attention from the user or *administrator*.

Smart Scheduling: A feature, introduced with Diskeeper 6.0, which has a built-in mechanism to determine how frequently a disk *volume* needs to be *defragmented*. With Smart Scheduling, Diskeeper automatically schedules defragmentation runs to occur more often when a disk volume becomes more fragmented, or less often when it becomes less fragmented.

SMS: System Management Server. A *software* product from *Microsoft*, which permits the *system administrator* on a Windows NT, Windows 2000 or Windows Server 2003 *network* to do such things as install and run new software on different computers on the network, all from a single location.

snap-in: A program, such as Diskeeper, that can be used with the Microsoft Management Console (*MMC*). For more information, see the MMC Help facility.

software: A generic term for computer *programs*, taken collectively. Contrast with *hardware*. Software can be categorized into *application* software and *system* software.

sparse files: A method of storing large files—that contain mostly empty space and not much data—in a way that uses much less disk space than would otherwise be used. Sparse file support allows an application to create very large files without committing disk space for every byte.

swap file: A *file* on a *disk drive* that *Windows* 95/98/Me uses to hold temporary *data* that will not fit into *memory*. When needed, the *operating system* moves data from the swap file to memory. See also *paging file*.

system: The collection of one or more computers and *peripheral devices*. Sometimes used as a synonym for *operating system*, or the combination of *hardware* and *software*, as a logical unit.

system administrator: The person in charge of maintaining a multi-user computer *system*.

system file: In general, a *file* that is part of, or *accessed* by, the *operating system*. The Diskeeper Drive Map display shows certain system files in green, particularly the *master file table* (MFT) and several other files that cannot be moved safely by Diskeeper (or any other defragmenter). These are not the files that make up the Windows *operating system*, but the files that make up the *NTFS file system*.

task: A *program* or portion thereof that is run as an independent entity.

terabyte: A measure of computer storage capacity equal to 2 to the 40th power or approximately a thousand billion *bytes* (or a thousand *gigabytes*).

trialware: A free software package from Executive Software, such as Diskeeper, that has the same functionality as the official version of the software, but which works for a limited time period, after which it expires. Trialware allows you to try the software before making a buying decision.

utility: A *program* that provides basic services or functions.

volume: A subdivision of the space on a *disk drive* that is treated as though it were a separate physical unit, or a combination of physical disks treated as a single unit. A computer with only one hard disk drive can have a single volume, often called drive C:, or it can have several volumes, such as drive C:, drive D:, and drive E:. See also *drive letter, logical drive, partition*.

volume set: In *Windows*, a single *logical drive*, which is composed of up to 32 areas of free space on one or more *disk drives*. Volume sets can be used to combine small areas of free space on one or more disk drives into a larger logical drive, or to create a single large logical drive out of two or more small disks.

Windows: A family of *operating systems*, first introduced by *Microsoft* in 1983, with a *graphical user interface* and which ran on *MS-DOS* based computers. See also *Windows 95, Windows 98, Windows NT, Windows 2000, Windows XP and Windows Server 2003*.

Windows 2000: Originally named *Windows NT* 5.0, Windows 2000 is a family of operating systems for desktop computers and network servers, announced by *Microsoft* in 1998. Windows 2000 resembles *Windows NT* 4.0 and *Windows 98*, but has many enhancements and new features. Windows 2000 is available in several editions, ranging from Windows 2000 Professional to Windows 2000 Advanced Server.

Windows 95: A version of *Windows* released in 1995. New features in Windows 95 with regard to its predecessor, Windows 3.1, include a new user interface and support for 32-bit applications. See also *OSR 2*.

Windows 98: Successor to the *Windows 95* operating system, Windows 98 features support for the *FAT*32 *file system*, greater Internet integration, and supports recent hardware developments.

Windows Me: Short for Windows Millennium Edition, an operating *system* released by *Microsoft* in September 2000. Successor to *Windows 98* and designed for home use, Windows Me offers enhancements in the areas of digital *media*, *user interface*, home *networking*, and the *Internet*.

Windows NT: An *operating system* released by *Microsoft* in 1993 (NT stands for New Technology.) It has a similar *graphical user interface* to *Windows*, but it does not run over *MS-DOS* and has been designed specifically for computer *network* environments.

Windows Server 2003: An operating system released by Microsoft in 2003 as the follow-up version to Windows 2000 Server. Like its predecessor, it has a similar graphical user interface to Windows, but it does not run over MS-DOS and has been designed specifically for computer network environments. Windows Server 2003 is available in Standard, Web, Enterprise, and Datacenter editions.

Windows XP: An operating system released by *Microsoft* in 2001 as the follow-up version to *Windows 2000*. Like its predecessor, it has a similar *graphical user interface* to other Windows versions, but it does not run over MS-DOS and has been designed specifically for computer network environments. Windows XP is available in several editions for different uses, such as Windows XP Professional for corporate use, or Windows XP Home Edition for home users.

workgroup: In *Windows NT*, *Windows 2000*, *Windows XP*, or *Windows Server 2003*, a workgroup consists of one or more computers that do not participate in a *domain* and are therefore responsible for their own security and administration.

workstation: A computer that has been set up for use by an individual typically connected to a *network*. The term is also used to indicate a *client* computer, in contrast with a *server*.

x86: Symbol to represent a series of *CPU*s, manufactured by *Intel* and others, including model numbers 8086, 80286, 80386, 80486 and 80586 (*Pentium*). All of the CPUs in this series have certain characteristics in common, which permits *software* to be written that will run on any of them.

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